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VIRTUAL REALITY SERVICE TO ALLEVIATE PERFORMANCE ANXIETY AND STAGE FRIGHT –

SpeakerVR, Case Study

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ABSTRACT

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Utilizing Virtual Reality in alleviating performance anxiety contains significant possibilities and has been discovered to be a powerful tool and this kind of techniques and service may revolutionize treatment of alleviating performance anxiety and stage fright. This study examines techniques of alleviating Performance Anxiety and Stage Fright by Virtual Reality simulation. The study is conducted by tests and interviews. The study contains a design process to build the presented VR simulation and evaluation process, which contains interviews and pre-tests to develop the VR-simulation and the test-runs. This study has been driven by desire to understand the nature and possibilities of XR services and simulations in alleviating stress and anxiety. More accurately, in this study's case, Stage Fright and Performance Anxiety and Stress related to public performance/speaking, are observed in the light of researching possibilities of alleviating the user by utilizing human technology interaction in conscious and possibly non-conscious levels by stimuli, which are supposed to have an effect through affecting users emotional state and through shorter time lasting emotions. The study presents design and development process of Virtual Reality (VR) Simulation, called SpeakerVR, which is a VR-service and simulation to alleviate/diminish users Stage Fright and Performance Anxiety and as well to help the user in the performing in front of an audience and evaluate and discuss about this kind of VR- simulation's possibilities. Also, it discusses whether this kind of VR-simulation could become a powerful scientific research apparatus. In the study is presented a testing simulation which is based on SpeakerVR, VR-simulation. For the study, the SpeakerVR is built only with parts which are relevant for the study as the VR-simulations commercial version contains much more actions but is not scientifically observable as it has much happening at the same time and therefore, it's not possible to understand which of actions triggered something measurable. The design process is multidisciplinary and to reach the goals set for the design and the study, the design and study processes are selected to contain elements from Psychology, Game and Internet studies, Human Computer Interaction, Game Design, Industrial Design, Human Cantered Design, Gamification and Psychiatry and their methodologies. Therefore, further in this study/document several techniques and phenomena are explained by utilizing multidisciplinary sources whenever suitable solution is found from any disciplinary but staying inside the delimitation of the study and design process.

Keywords: Priming, VR, Performance Anxiety, distress, avatar, interaction, emotion communication, social appraisal, emotion contagion, empathy, mimicry, gamification

Preface

I would like to thank postdoctoral research fellow Dr. Mikko Salminen, without whose careful supervision this thesis would have never been completed. I would like to thank my loved ones, my family so deeply and humbly from tolerating everything related to these studies.

Orivesi, 20 December 2019

Mikael Latva

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LIST OF SYMBOLS AND ABBREVIATIONS

AR	Augmented Reality
EEG	Electroencephalogram
MEG	Magnetoencephalography
MPA	Music Performance Anxiety
URL	Uniform Resource Locator
UX	User Experience
MR	Mixed Reality
XR	Extended Reality
PA	Performance Anxiety
SF	Stage Fright
VR	Virtual Reality
VRET	Virtual Reality Exposure Training

1. INTRODUCTION

Utilizing Virtual Reality in alleviating performance anxiety contains significant possibilities and has been discovered to be a powerful tool and this kind of techniques and service may revolutionize treatment of alleviating performance anxiety and stage fright.

Virtual Reality Exposure training is proved to be powerful tool in the treatment of phobias like combat related post-traumatic stress disorder, post-traumatic stress disorder in general Difede, J. Et al. (2011); Rizzo, A et al. (2009); Rizzo, A et al. (2013), fear of flying Rothbaum, B.O.; et al. (2000), arachnophobia Bouchard, S.; et al. (2006), fear of public speaking Pertaub, D.; et al. (2001); Takac, M., Collett, J., Blom, K. J., Conduit, R., Rehm, I., & De Foe, A. (2019) and musical performance anxiety Orman, E. (2004); Bissonette, J. et al. (2016)

This study examines techniques of alleviating Performance Anxiety and Stage Fright by Virtual Reality simulation. The study is conducted by tests and interviews. The study contains a design process to build the presented VR simulation and evaluation process, which contains interviews and pre-tests to develop the VR-simulation and the test-runs.

The meaning of the findings of this study is that suggested effects and phenomena seem to exist and that there are yet much to study left and that the Virtual Reality seem to open new doors and reveal more new rooms in human mind and new possibilities to utilize these opportunities, of which many lean in knowledge, which already was known, but was chained by the rules of reality.

This study has been driven by desire to understand the nature and possibilities of VR and AR services and simulations in alleviating stress and anxiety. More accurately, in this study's case, Stage Fright and Performance Anxiety and Stress related to public performance/speaking, are observed in the light of researching possibilities of alleviating the user by utilizing human technology interaction in conscious and possibly non-conscious levels by stimuli, which are supposed to have an effect through affecting users emotional state and through shorter time lasting emotions.

The study observes how a user would experience simulated Performance Anxiety training in Virtual Reality (VR) comparing the experience to real-life situation. The research delimitates to studying alleviating stress experience of Stage Fright and the experience of Performance Anxiety in VR-simulation.

It studies qualitatively to get knowledge, whether the VR-experience corresponds real-life experience. It penetrates the question as user experience question which will be evaluated from user experience point of view asking how the test-users would estimate it to be like. This is studied in a qualitative interview formed along guidelines in Tuomi, J., & Sarajärvi, A. (2018) and Stake, R. E. (2005).

The Master's thesis presents a design and development process of Virtual Reality (VR) Simulation, called SpeakerVR, which is a VR-service and simulation to alleviate/diminish users Stage Fright and Performance Anxiety and as well to help the user in the performing in front of an audience and evaluate and discuss about this kind of VR- simulation's possibilities. Also, it discusses whether this kind of VR-simulation could become a powerful scientific research apparatus. In the study is presented a testing simulation which is based to SpeakerVR, VR-simulation. For study, the SpeakerVR is built only with parts which are relevant for the study as the VR-simulations commercial version contains much more actions but is not scientifically observable as it has much happening at the same time and therefore, it's not possible to understand which of actions triggered something measurable. The design process is multidisciplinary, and to reach the goals set for the design and the study, the design and study processes are selected to contain elements from Psychology, Game and Internet studies, Human Computer Interaction, Game Design, Industrial Design, Human Cantered Design, Gamification and Psychiatry and their methodologies. Therefore, further in this study/document several techniques and phenomena are explained by utilizing multidisciplinary sources whenever suitable solution is found from any disciplinary but staying inside the delimitation of the study and design process. Beckman, S. L., & Barry, M. (2007)

The design process and the study contain similarities to meta-analysis as kind of multidisciplinary fact-finding; The components to build on the study and design process, has been collected from various multidisciplinary sources under various earlier specified disciplines utilizing fuzzy design process Li, Y., et al. (2018). The study's design process later presents how the solutions are found by combining all the collected pieces into the one completeness to blend together to form a single entity forming the study and the design of the VR-simulation presented in the study. Gasparini, A., & Chasanidou, D. (2016); Beckman, S. L., & Barry, M. (2007) This means that design and study process has been started before all the data was collected and that more data is collected during the process when needed.

Design process often contain innovation processes which are difficult to understand because of their indeterminateness, which is often found as the fuzziest states in the beginning of processes Varsaluoma, J., Väätäjä, H., Kaasinen, E., Karvonen, H., & Lu, Y. (2015). During the first phases, the determination phases, seem to be the fuzziest, which, describes the phase quite well as in this phase the designers often have a little amount of knowledge to build the solution and designing with too little amount of information leads to multiple solutions, which all seem like possible and therefore the of the process may seem fuzzy, but could be called fuzzy-based as it reminds very much like fuzzy-based hybrid Taguchi method for multiobjective optimization of product form design, which is sometimes presented with a picture of teapot of which the designer only sees the top, but he/she would yet know what the whole teapot would look like. Varsaluoma, J., et al. (2015), Li, Y., Shieh, M., Yang, C., & Zhu, L. (2018) A fuzzier phase is often located from the beginning of the process, but as well almost as often it is found in any parts of the design process and is called as fuzzy design thinking and fuzzy design process, for which specific characteristic is that the designer only has part of the needed knowledge to build solutions, and therefore the designer will get multiple resolutions and then the designer must make choices, but with very little knowledge of what the design is to become. Li, Y., Shieh, M., Yang, C., & Zhu, L. (2018); Varsaluoma, J., et al. (2015); Tuomi, J., & Sarajärvi, A. (2018); Stake, R. E. (2005) However, in this study's case the fuzziness has been strived as far and as mild as possible, to keep the process as scientific as possible and understandable, logical and transparent.

This kind of methodology has been utilized here in both, firstly in the development process of functionalities needed for reaching the user experience of the system to reach the sufficient quality and secondly in the development process of the functionalities alleviating Performance Anxiety and Stage Fright and related Stress. VR-simulation's practical issues and visual cues of emotional state and especially stress, such as bodily tension, muscular tension, tension in neck or raised shoulders and observing users body posture or respiratory to emulate interaction in VR-simulation and to build interactive functions to the VR-simulation to make the study possible. The estimation of emotional state is extremely shallow and exist in this study only to represent a possibility to build services on them, but which are possibly known not well enough and therefore would need future studies. Peper, E., Lin, I., Harvey, R., & Perez, J. (2017); ; Riskind, J. H., & Gotay, C. C. (1982) The estimation is needed in test-phase where the researcher runs the Virtual Reality's interaction utilizing the Wizard of Oz method. The researcher offers interactive cues along observation of the user.

A significant role was in building the knowledge and finding the solutions by examining research papers and studying researches related to design problems, which made the design process to resemble a learning process inside design process as presented by Beckman, S. L., & Barry, M. (2007). The knowledge and research papers found by the design studies of experience design process held by Kirsikka Kaipainen 2018-2019 in Hervanta, helped in keeping the design process under scientific lens, which may often be difficult in common design processes as the ideas often seem to pop up from nowhere. Beckman, S. L., & Barry, M. (2007).

The nature of game studies and human technology interaction and User Experience (UX) research and general design process are multidisciplinary, which is widely visible during the process of this study and here, the data collection process has been carried out mainly in qualitative light, as qualitative methods has been proved to be powerful tools together with design thinking methods; However, design process, innovative thinking and how and where the solutions came, how the solutions were found is often difficult to open later because of the fuzziness of innovations and design processes nature. Kleinsmann, M. S., et al. (2017); Gasparini, A., & Chasanidou, D. (2016). Beckman, S. L., & Barry, M. (2007); Tuomi, J., & Sarajärvi, A. (2018)

The study examines as a case, whether the users inside the VR-Simulation would experience Performance Anxiety and Stage Fright and related Stress similarly like in real-life situation and to understand relation between real-life situation and Virtual Reality. This asked in the user interviews after test-set. On the other hand. the alleviation of Performance Anxiety was supposed to be examined to understand by interviewing the users asking, if the alleviation of the user feels actually really about alleviating Performance Anxiety and Stage Fright and related Stress and not something else, which would need more studying and evaluation of research's test set-up to this direction with evaluated methods.

The idea for building the service bred from a need of creating something that would help people in general. The high interest, curiosity and fascination with the idea of relieving being and increase well-being in general by using affective emotional tools to emotional interaction and gaining the understanding of the subject in general led to decision to build these tools to study their possibilities in alleviating users stress and anxiety, more accurately, Stage Fright and Performance Anxiety.

The idea of methods of examining Performance Anxiety and Stage Fright and their related Stress as the phenomena are stress related and somewhat much already researched and

seemed to have correspondence to Musical Performance Anxiety (MPA) as Bisonette j. et.al. (2014) proposed, and as Musical Performance Anxiety was already somewhat highly examined area and seemed to contain fruitful similarities it was worth trying and it proved out during the design and study processes to be rich area to study.

The core behind the design & development process of the VR-simulation presented, arose firstly from examining of affecting users emotional state by exposing the user to various stimulus, which would have positive or strengthening effect on the user. And strong greed existed to know and understand the phenomena more deeply, even to build rewarding gamification system over these functions; What if gamification was built on gaining good feeling? The process led to design of VR-simulation, which is called SpeakerVR of which main function is to alleviate user in his/her Performance Anxiety and Stage Fright and Stress related to speaking in front of audience. Later the development and design rely mainly on theories of virtual reality exposure training (VRET). Design and development also follow an idea of Stage Frights and Performance Anxiety containing similarities to studying and alleviating Music Performance Anxiety (MPA) Bisonette J. et.al (2014). Other functionalities, experimental tools of affecting through emotions are built on these core structures and on ideas which were found during the course of Emotions in human computer interaction of Julia Kuosmanen during the autumn 2017 and spring 2018. The service was tested using small sample size and mainly utilizing qualitative methods. Qualitative data may be representative for development purposes, but later research will be needed as this study should be considered as an initial study, but partly experimental study. Tuomi, J., & Sarajärvi, A. (2018); Stake, R. E. (2005) Klinger, E., Légeron, P., Roy, S., Chemin, I., Lauer, F., & Nugues, P. (2004)

Firstly, the study examines immersion and feeling of presence in the VR-simulation, because it is assumed that the experience of Stage Fright and Performance Anxiety are so fundamentally human experiences, that they may have high correlation in the deepness of immersion and presence. Ermi&Mäyrä (2007) How deep the experience of presence and immersion is often used as an indicator of quality of user experience. Ermi&Mäyrä (2007).

Secondly, the experience of Performance Anxiety and Stage Fright comparing to differences between an experience of public speaking in front of an audience in real-life and an experience of Performing to simulated public audience in Virtual Reality simulation is examined. This cases research apparatus , which in this case is a VR-Simulation, is designed to alleviate Performance Anxiety, Stage Fright. The study as well

contains an examination of the design and development process of the VR simulation (The SpeakerVR).

Stage fright and Performance anxiety are in this study connected together as in the presentation in the VR-simulation at first the user meets a stress alleviating VR-scene before the user meets the audience in the presentation room, where the stage is located. In the first phase the user's Stage Fright is lowered by trying to diminish user's stress level by exposing the user to affective relaxing surrounding. Before going to perform in the stage in front of the people, the user's stress is alleviated by giving a choice to take his/her time to relax and decide when he/she has taken his/her time and he/she would feel ready. Giving a choice of besides, whether to go to the stage to give a presentation to the audience or relax and wait whether waiting would raise stress level. Then on the stage during the presentation, the user is exposed to affective alleviating cues which are supposed to alleviate Performance Anxiety.

How the emotional affects are used is connected to the study's design process as it utilizes a design thinking process lines, where gamification, in very positive manner, is one of the key design drivers. Gamification in this study is understood as a phenomenon, which contain most relevant elements of game and play. Salen, K. & Zimmerman, E. (2003); Huizinga, J (1955). Gamification is seen as a process containing these characteristics of game and play, where it takes part in action by his/her intrinsic motivation and as a game-like playful experience where the user participates in the game/play-like action by his/her own accord as presented by Salen, K. & Zimmerman, E. (2003). If gamification is not friendly gamification, meaning that it should only breed good to the user, the study assumes, that it will not be gamification, but something else and outline your research topic into use of gamification within the previously presented.

The being inside the VR-Simulation's presented experience is studied from a point of view of as being in VR-simulated surrounding space and acting that there were to a user a play- and game-like experience and the user would be set to a state where the user is set inside the magic circle presented by Salen, K. & Zimmerman, E. (2003), but brought to other culture Huizinga, J. (1955), which whenever is whatever ,yet still staying in the magic circle as the user would kind of play or/and immerse himself/herself inside the experience as feeling like giving a real presentation to real audience. However, this service produces benefit to the user and therefore it cannot be told to be a game, but it can only be game-like. Salen, K. & Zimmerman, E. (2003). It seems, that users seem to experience everything to happen like if they were in real-life as they act like they were in

real-life interaction situation, which seems to happen along the user interviews: “Pretty much like speaking in real life same emotion like in real life like anxiety and stress” (User, VR-test, 2019), “this is so full-blown experience.” (User, VR- test, 2019).

The processes of design and development of the VR-Simulations tools to alleviate Stage Fright and Performance Anxiety is presented further in this document under the title: “Design process and design evaluation process.”

The interest to examine possibilities of gamification in light of using the affective functions in the commercial version of the presented service, was a great driver into this study as well as was the great interest in the gamut of priming effects and their power as VR-services commercial version’s possible methods of manipulating users emotional state in and then explore the possibilities of how positive gamification could build on those mechanisms and how input and output to user could be designed and utilized and to simply understand more by studying the phenomena from this field of psychology. In this study, the commercial version of VR-Simulation was designed to a simplified version to make possible to study the research subjects. In this study the question is delimited to if the users mimic the body postures or not. This is question is isolated in design process research part as in the design process rose possible research questions from a design process of VR-services commercial version design process .

As the method is mostly qualitative, the research hopes if it could find out more as for an example, it is needed at least in future to research if/when the user has mimicked him/herself into certain body posture, if being in these body postures would affect on the user's emotional state, mind or raise emotions or gives other benefits to user or disadvantages, or if the users would mimic all the presented body postures and what are the effects on that. The design process examined if and how this kind of tools, affective cues, could be utilized in cases of gamification as prizes. The user would get rewards as good feeling. Peper, E., et al. (2017); Riskind, J. H., & Gotay, C. C. (1982)

This idea is about helping people by building the positive gamification by using these effects to reward the user/player through affective priming, mostly positive, of course for an example the user could be rewarded with a stimuli, which would give a little joy/happiness by smile or adoring gesture or by changing soundscape to more pleasant. So, it led to the idea behind the development of the VR-service called SpeakerVR, that arose firstly from studying the possibilities of using priming effects practical use of affecting users mind by affecting on emotions and emotional state of user to help anxiety or to gain some other positive changes.

This study as well examines, as design drivers, the possibilities of virtual reality in representing tests of psychology, by studying literacy and studies, by which this research would find the needs or/and possibilities for future research when the presenter VR-technology would be developed further.

The study containing its design processes is a multidisciplinary research process in the fields of psychology and communication sciences seasoned with gamification, design and human technology interaction, utilizing the possibilities in simplifying testing and measuring methods of phenomena in psychology and it reflects those through phenomena of gamification in the design process. The terms of play, game and gamification have great ambiguity. In this study gamification and gamefullness refers to gamification as a tool to generate situations where the user does everything by their own will and what the user accomplishes, gains, reaches or attains are only everything that makes the user things that he/she independently, intrinsically wants. Mauss, I. B., & Robinson, M. D. (2009); Sutton-Smith, B. (1997;2001;) Deterding, S., Dixon, D., Khaled, R., & Nacke, L. (2011). It examines the phenomena from gamification point of view as experiences which users would consume, they consume only voluntarily and willingly. Salen, K., Zimmerman, E., (2003). The presented methods will be opened as aiming to answer of how the presented techniques could be utilized into practical usage of estimating changes in stress level as well this study examines how stress could be tuned from outer input to human on emotional state level in HCI. The VR design setups are discussed and examined and developed through examining them as examples of understanding VR as if experience of stress is immersive in giving a presentation in VR-simulation.

A one separate goal is a examining the development of research apparatuses into VR-simulations and read the research data from point of view of development at the side of finding scientific answers to research questions. As when the data is qualitative it might be possible to find something that the research was actually not aimed directly. Stake, R. E. (2005); Tuomi, J., & Sarajärvi, A. (2018).

2. BACKGROUND INFORMATION

This chapter gives a brief overview of relevant topics and terms, focusing on the relevant subjects of psychology, design and game research; Firstly, it focuses on the theories behind the research topic and the process and secondly it focuses in the theories behind topic by discussing with the design and development process illuminating the way with knowledge of disciplines of psychology, design and game research. Later the study is divided in three sections. The First section in the beginning discusses existing research on Performance Anxiety and Stage Fright, while the second part focuses on the different conceptualizations of possibilities in helping Performance Anxiety and Stage Fright in relation to social anxiety. Focusing is also in connecting psychology and possibilities of gamification. Then the third part examines and familiarizes the practical issues of bringing the techniques under testing and experimental checking.

The study follows the approach of studies of MPA (Musical Performance Anxiety) and how MPA relates to Performance Anxiety (PA) and Stage Fright (SF) and studies how to alleviate and treat those in corresponding areas and the study adopts ideas e.g. from the fields of information sciences, psychology, sociology, and philosophy, and elaborates further by connecting findings together in the design process. Bissonnette, J., et al. (2016) The study uses self-reported data and observed data of user's behavior and experience of using the VR-simulation. A relationship of Performance Anxiety, Stage Fright and their related Stress are examined comparing of how they are experienced between a simulated set-up of giving a public performance e.g. speech in front of the virtual audience. The study observes the phenomena in the light of psychology and user centred research & design, and it discusses the possibilities in utilizing VR-simulation alleviating users in their Performance Anxiety, Stage Fright and related stress. The virtual audience actually does not really react to the user, but the audience is populated enough to make possible to the user not to notice this lack of interaction, which then would not lead to a problem of lacking relevant real actions to the user. Klimmt, C., et al. (2012). As Bissonnette, J., Et al. (2016) substantiated, musical Performance Anxiety would be similar to Performance Anxiety in both performing in real-life situations and performing in virtual reality. However, Bissonnette, J., et al. (2016) pointed out that they found a difference between genders, which may not exist in non-musical performance. As well Bissonnette, J., Et al. (2016) showed that musical Performance Anxiety would be similar to Performance Anxiety in real-life speakers. In Performance situations of music or speech the users experience of Stage Fright seem to be almost completely similar. Bissonnette,

J. et al., (2016). Therefore, researches of Musical Performance Anxiety (MPA) are relevant when examining Performance Anxiety and Stage Fright in other conditions. This relationship between experience of anxiety in speech stage performance and musical performing seem fluid and valuable to support the ideas in both research and design process. It seems that Stage Fright and Performance Anxiety is a general problem which has had significant interest in various disciplines and as well outside scientific communities. Bissonnette, J., Et al. (2016); Schajatovic, G. (2017); Garner, A. M. (2012).

Later the chapter presents the previous work concerning the phenomena examined as related to this research, the work in the field of VR-simulations and tangential to texhniques of XR-solutions slightly widened to the area of real-life situation stress alleviating digital service, which all was extremely important knowledge and drivers in the design processes. In this study XR means all the possible realities and modalities and techniques that can be used to represent or change reality and to ad or diminish something sensible and perceivable to or from reality.

These phenomena concerning the presented designs and the design process presented are outlined into the research of the current needs of the VR-study and VR-simulation, estimating/measuring and manipulating emotion/emotional state and is emphasized to study stress and anxiety, Stage Fright and Performance Anxiety, related Stress and alleviating those by creating positive or strengthening or relaxing affects and in the opposite direction, to affecting the user by the stimuli presented to the user in the VR-simulation like along needs and and experiences of user in the presented situation Bissonnette, J., Et al. (2016) and Garner, A. M. (2012) and Orman, E. K. (2003). The chapter reviews and defines the elements and methods related to the presented research apparatus of measuring emotions aiming on stress-research aiming on studying the alleviating stress and anxiety in performance and Stage Fright for studying stress related immersion and feeling of presence as examined by Ermi, L., & Mäyrä, F. (2007) related to Witmer, Bob G. & Singer, Michael J. (1998), whose both questionnaires were used as basis of the questionnaires and interviews of the study.

The design process examines of which tools of VR-simulation and which modalities of interaction would be possible and efficient to use as interaction tools and what would be needed to examine stress and emotional state of the user in order to implement the study and what is needed to carry out the testing and what would be needed to enforce the observation needed to accomplish the simulations realization with the wizard of Oz technique. Pan, X., et al. (2018). The design process of the VR-simulation, the research

apparatus, and the phase of designing the study precedes the examining and observing of emotional state, information gathering and as well it defines the methods of research of observing the changes in emotional state of user and what kind of techniques could be utilized while staying inside the frames of the study. The review is framed to examine mostly on stress related issues noticing or estimating/measuring changes in the emotional state of user only, but not emotional state precisely, like what emotional state,, but examining whether any signs of changes in emotional state or body-language presenting possible changes. Lallemand & Koenig (2017); Orman, E. K. (2003) As well this review examines the phenomenon from point of view of increasing well-being and affecting to emotional state of user, to ease users stress and anxiety and to make their being easier in general asking the users to self-report whether this kind of service would feel usable in alleviating Performance Anxiety or/and Stage Fright.

2.1 Performance Anxiety and Stage Fright

As Bissonnette, J., Et al. (2016) substantiated, that Performance Anxiety of musicians would be partly similar to Performance Anxiety of speakers in both, real-life situations and in virtual reality. As well Bissonnette, J., Et al. (2016) showed that musical Performance Anxiety would be significantly similar from essential components to real-life speakers Performance Anxiety and Stage Fright, however the users seem to have difference in how and when the Performance Anxiety raises in action and what are the issues that e.g. inflicts the perfectionism related anxiety. (Bissonnette, J., et al. 2016). Therefore, the researches of Musical Performance Anxiety (MPA) and Musicians Stage Fright are relevant when examining Performance Anxiety and Stage Fright. Dobos, B et al. (2018) It seems that Stage Fright and Performance Anxiety is a general problem which has had significant interest outside scientific communities as well. Dobos, B., et al. (2018; 2019) Nielsen, C., et al. (2018), Garner, A. M. (2012). If the experience of anxiety raises in very early state before actual performance, it seems to be called as Stage Fright and the anxiety it raise later or stays longer than the performance would last, it may be called only as stress or anxiety.

Schajatovic, G. (2017) describes performance anxiety as a phenomena, which is partly dividable into two categories, which are State Anxiety and Trait Anxiety. State anxiety is situational and based on single separate situation. Schajatovic, G. (2017, Feb 16). Trait anxiety is about perfection and need to please everyone and scare to show failure to people, low self-esteem on stage. Schajatovic, G. (2017, Feb 16). Both of the types of

performance anxiety, state anxiety and trait anxiety can be divided in somatic, cognitive and affective anxiety. Schajatovic, G. (2017, Feb 16) This information is used in supporting design process in designing the affective ques and in hypothesis of those.

The relationship between experience of anxiety in stage performance and musical performing supports the ideating in design process in this study. As well performance anxiety is related to social phobia. Bissonnette, J., Et al. (2016); Roy, S., et al. (2003) Performance Anxiety and Stage Fright and their related stress issues have been studied scientifically in multidisciplinary ways and from multidisciplinary viewpoints of various disciplines and non-scientifically as well and heavily in general.

Performance Anxiety has three different areas, which are connected together, reactions in physiology, subjective experience and interpretation of the experience. Musical Performance Anxiety highly correlates to Social Anxiety. Music Performance Anxiety has its own characters, which are more original in Music Performance Anxiety, but these characters still have correlation through Social Anxiety and Performance Anxiety especially when the user is perfectionist. However, perfectionism and dimensions of multidimensional perfectionism are important characters in Performance Anxiety and Stage Fright and are comparing highly to social phobia/anxiety and public speaking anxiety's characters in how and when the instant experience of anxiety and stress breeds. Correlation between users own negative and positive perception of user's own performance and the post-event rumination after social events is causing anxiety taking place after the performance, which correlates similarly or at least contain strong similarities to social anxiety and may correlate meaningfully. Nielsen C. et al. (2017), Kenny, D. (2012, 2013) Dobos, B et al. (2018), Griffiths, N. (2013)

It is assumed that those phenomena would be found in the interviews and in observation in the tests of this study in Virtual Reality. Therefore, Earlier findings between MPA and PA can be utilized to build a relevant tool and knowledge to be used as basis of designs of how to alleviate Performance Anxiety and Stage Fright and related Stress. Later these findings or suggestions are explained when these correlations are examined or reported. Nielsen C. et al. (2017), Kenny, D. (2012, 2013) Dobos, B et al. (2018), Griffiths, N. (2013) It is assumed that this kind of service would breed real-life like experience of Performance Anxiety, Stage Fright and stress. Does the experience of Performance Anxiety, Stage Fright and stress contain similarity to related experience in real-life situation?

2.1.1 Therapeutic techniques and therapeutic VR-services

Methods of relieving Performance Anxiety have wide range from hypnosis to Virtual Reality exposure training and from what to eat to cognitive-psychotherapy and cognitive counselling, medication, yoga breathing exercise, training and more training, various diets and desensitization therapies. Garner, A. M. (2012), Klinger, E., Légeron, P., Roy, S., Chemin, I., Lauer, F., & Nugues, P. (2004)

Virtual Reality Exposure training is proved to be powerful tool in the treatment of phobias like combat related post-traumatic stress disorder, post-traumatic stress disorder in general Difede, J. Et al. (2011); Rizzo, A et al. (2009); Rizzo, A et al. (2013), fear of flying Rothbaum, B.O.; et al. (2000), arachnophobia Bouchard, S.; et al. (2006), fear of public speaking Pertaub, D.; et al. (2001); Takac, M., Collett, J., Blom, K. J., Conduit, R., Rehm, I., & De Foe, A. (2019) and musical performance anxiety Orman, E. (2004); Bissonette, J. et al. (2016)

Use of inoculation messages is a treatment that alleviates Performance Anxiety. Performance Anxiety may raise from users' attitude, beliefs or state of what others would think, that arouse the user and then the inoculation messages would send the user messages that argument against their beliefs by giving the user arguments that defend against the negative thinking which would arouse the user and then gain anxiety. Jackson, B., Compton, J., Thornton, A. L., & Dimmock, J. A. (2017), Harris, S. R., Kemmerling, R. L., & North, M. M. (2002); Klinger, E. et al. (2004)

Applications to training performance which contain interaction to avatars are in use in teacher training. In research use, TeachLivE, for an example offers possibilities to teachers to train their skills with students in middle school and high school. It provides different personality types of students and teaches how to manage with them. Avatars are experienced like human with personality variances. The represented students have different variances of personalities like aggressiveness and passiveness, dependency and independence. The service contains training of interaction with the students. The system bases on AMITIES framework which is an avatar-based framework to offer different personality types and behaviours to build the experiences over. It is based on interaction with different roles of interactors and the user. On AMITIES is built a variation of services. CollegeLivE is a virtual environment, where the users play like a live role game to alleviate students, which is built into Virtual Reality. Hughes, C. (2015), Lee, J. R. (2014), Mancini, T., & Sibilla, F. (2017)

Along Hughes, C. Et.al.(2015) Virtual applications offer possibilities to train teaching skills and try different methods without interfering real teaching and studying. In presented AMITIES framework contains scenarios that present interpersonal challenging situations like peer pressure and resistance and disturbing behavior or phlegmatic characters in various levels and ages and training for job interview. The avatars are purely driven by programmed behavior. The users train the situations, but as well it contains exposure training in gaining levels of difficulty and stressfulness. Hughes, C. E. et. Al. (2015).

The methods presented in the previous studies would be possible to build in VR-service alleviating stress and anxiety. These functions could be built for instance to audience as avatar-figures or in 360-video. Poggi, Jeanine. (2016). The design process tries to answer how would an Avatar-figure, who is presented as mentor or helping person, should become utilized as a tool to alleviate PA? In this study the alleviating avatar is called Tutor-avatar. The study examines if the presented and designed Tutor-avatar would have effects in user, which would alleviate Performance Anxiety, Stage Fright or Stress, would the users experience Tutor-avatar function as helping the situation or maybe alleviating the user's anxiety in the presentation situation in VR?

2.1.2 You're not alone – But would the Tutor-avatar help

Possible effect on emotional state by utilizing chameleon effect to make the user mimic an affective body pose posture, which then would affect a change in users emotional state which would then depend on users coping with the social situation. Peper, E., et al. (2017) ; Riskind, J. H., & Gotay, C. C. (1982)

Chameleon effect refers to nonconscious mimicry of behaviours of partners of interaction. (J. A. Bargh, M. Chen, & L. Burrows, 1996) Chameleon effect may be usable to intentionally affect on user's mood and emotional state. Along Peper, E. et.al., (Peper, E., Lin, I., Harvey, R., & Perez, J., 2017) body posture affects mood. Peper, E., et al. (2017) These phenomena, when used together simultaneously may offer possibilities to affect intentionally to user's mood and therefore open an option to e.g. to help users' anxiety by relieving being by changing the mood of the user. However, it might be possible to cause negative effect and then breed more anxiety and stress. The Tutor-avatar in VR-simulation can contain mechanisms of masked evaluative priming. Kiefer,M., et al.(2017), Parkinson. (2015), Peper, E., et al. (2017); Dixit, S., & Prasad, R. (2017). Vinciarelli, Pantic & Bourlard. (2009) ; Riskind, J. H., & Gotay, C. C. (1982)

Therefore, the study suggests that behavioral contagion could be used quite similarly as chameleon effect; Non-verbal communication with the Tutor-avatar could as well be used to change the emotional state of the user. As well the study suggests that the behavioral contagion and chameleon effect could be used simultaneously and gain deeper affect in users' emotions and emotional state. In this study's presented design only, positive interaction is used to simplify the research's test-set-up. The presented effects and ideas of their usage are used in later presented design process, and in design process they are utilized mainly as tools and drivers of design development. Peper, E., et al. (2017); Vinciarelli, Pantic & Bourlard. (2009); Parkinson. (2015) ; Riskind, J. H., & Gotay, C. C. (1982)

The study examines if the presented and designed Tutor-avatar would have effects in user; will the users mimic the avatars body-postures and whether comments on suggested phenomenon would raise from the interviews?

2.1.3 Emotions feelings and moods – Design of the VR-simulation – Methods of relieving Performance Anxiety

The design of VR-simulation contains affective actors. These actors are built in to alleviate Performance Anxiety, Stage Fright. The study examines if the presented and designed Tutor-avatar would have effects in user; will the users mimic the avatars body-postures and whether comments on suggested phenomenon would raise from the interviews?

The designed VR-Simulation in alleviating stress and Performance Anxiety and Stage Fright relies on building emotional interaction on emotion contagion, cognitive priming, priming and behavioral overall priming and affective priming. Aarts H., et al. (2008). At first in the beginning of the play before giving the actual presentation the user is brought to relaxing atmosphere, which most feel relaxing and calming, where the user can respite for a while before the presentation, which they often feel stressful and distressing. The user takes her/his time and starts the presentation when he/she feels ready or wants. The idea is to lower the stress level as alleviating Stage Fright to change the users emotional state to more relaxed as it would be in common situation, before the user is about to go in front of an audience. This, if the user would be exposed repeatedly several times the user's body and mind might learn to not to react so strongly an in his/her common exposing to the same situation in real life. During the play, the presentation the user is helped on conscious level by a tutor, who tells the user when to talk slower, when faster,

how much time is left and helps in general by giving information about what to do and if it's going well. Negative feedback is not used. The Tutor avatar-figure contains built in cues , which are not clearly understandable and may contain non-consciously receivable messages, which may have meaning, but are still nonverbal messages, triggers, which are designed to affect users emotional state and mood and possibly rouse feelings. These changes are designed to give positive feeling, arouse or calm down, or feel stronger or more self-confident in accordance of the need of the moment. Vinciarelli, Pantic & Bourlard. (2009)

The interview contains questions which are designed to give information about the performance of the Tutor avatar-figure. However, the sample size shapes the study extremely qualitative as the sample size is so small, but some interviews often are quite rich. It was assumed that the study would give more information about emotional factors in the user. This part did not succeed as well as planned, but it most certainly would have given the information e.g. if it could have been possible to use physiological measurements as planned, however, it seemed that some of the users changed their posture when the Tutor avatar-figure changed its pose. Peper, E., et al. (2017), Tuomi, J., & Sarajärvi, A. (2018); Stake, R. E. (2005) ; Riskind, J. H., & Gotay, C. C. (1982)

Shaerlaeken et al. (2017) suggest that Virtual reality exposure training to an artificial audience is a plausible way to train to tolerate Performance Anxiety. Performance anxiety is related to social phobia Roy, S., (2003) and can be alleviated by Virtual Reality exposure training. Klinger, E. et al. (2004). It is proved that virtual reality exposure training is proven method to alleviate Musical Performance Anxiety. Orman, E.K. (2004); Bissonette J. et al. (2016); Klinger, E. et al. (2004) Would the users report if the VR-service could be believed to teach to appear before an audience and giving public speeches of perform over an audience?

2.2 Stress

Stress as a term is widely utilized in various meanings and in in varied disciplines and applications from Scientific Psychology to e.g. metallurgical fatigue like in aerodynamics and various ways in spoken language. Stress as a word often is used to represent something that is under a situation in which the object of stress is disturbed from normal level to an area where it is affected to weaker state. Mark A. Staal, (2004) In this research

stress as a term of stress of psychology is utilized from a viewpoint of stress as an emotional state and its relations. Kuosmanen J. (2018).

Stress effects on human performance in cognitive, memory and common performance are widely known. Stress as fatigue is connected to anxiety and stress may affect on emotional state and behavior of user and diminish performance as well. Staal Mark A. (2004) The design process examined whether it would be possible to build stress alleviating psychological functions affecting in diverse areas to human behaviour, which questions were important drivers during the design process and

2.2.1 Estimating changes in anxiety or/and stress of the performer

Related to certain need of data quality of measuring current stress level is highly driven by what kind of usage situation is currently on and examined. If the current case was a scientific experiment, then it might need more exact data than if it was an application which would not need but a hint of which direction the emotional state would be changing, when the methods of estimation/measurement would be completely different. As well the research set-up defines what is needed as if the level should be estimated or notice a change in a level. Scientifically exact measurement might often be needed, but in other cases only correlation-based knowledge might be enough depending the need. This case observes whether there's a change in the level, but not more accurately. Mauss, I. B., & Robinson, M. D. (2009); Orman, E. K. (2003)

In this study the level of observing of emotions and emotional state is delimited to only noticing if any change in emotional state or emotion occurs as self reportedly or noticeable change in user's body posture along Orman, E. K. (2003)

2.3 The elements of interaction in Virtual Reality Simulation

However, the VR-services have not provided reciprocity in social interaction, this presented service contains elements of social interaction. VR presentations often contain situation in which the user is exposed to social interaction. In VR-services the users may believe non-living avatar-figures as real living humans or living organisms. Ravaja, N., Bente, G., Kätsyri, J., Salminen, M., & Takala, T. (2016). They may experience the relation to avatar-figures similar as interpersonal. (Ravaja, N., Bente, G., Kätsyri, J., Salminen, M., & Takala, T. 2016). Experiencing the avatars in VR as humanlike real people may be important in searching the reason why the users would experience the

situation of the performance so real and therefore as oppressive and distressing. However, using customizable avatars and it would be possible to present the user as 3rd person avatar when the user could use customizable avatar. 3rd person view might make the user feel distant to self and therefore might relieve stress. Kim, H., & Kim, S. (2016), Sioni, S. R., Burleson, M. H., & Bekerian, D. A. (2017), Sioni, S. R., Burleson, M. H., & Bekerian, D. A. (2017). Customisable hands might make possible to gain feeling of distance to self and as well relieve performance anxiety in this case. Distance to self might have an effect on anxiety, which breeds from fear of failure in front of other people. L Mancini, T., & Sibilla, F. (2017). Another ide might be to make customisable avatar, for the presenter which the user could see as a reflection in a mirror or in a window or other surface to gain distance to self and therefore diminish the affects gaining performance anxiety. Lee, J. R. (2014); Li, D. D., Liau, A. K., & Khoo, A. (2013) Moundridou, M., & Virvou, M. (2002)

Interaction methods of the Tutor-figures of the current VR-simulation may benefit from the same effect of experiencing avatar/agents as real-life figures as designing the interaction with the tutor-figure was built on the affects of social interaction similarly as Ravaja, N., Bente, G., Kätsyri, J., Salminen, M., & Takala, T. (2016) proved.

That the users, as Ravaja, N., et al. (2016) and Riedl, R., et al. (2011) proved, users may interpret avatars as real people and tune their expression of feelings/emotions like with real people may play important role in reinforcing presence and immersion which may be important in creating an experience of Performance Anxiety as resembling real-life situation. Sanchez-Vives, M.V.; Slater, M. (2005); Roy, S., (2003)

The situation of performing in front of the audience is social, however it might be shallower than in real life situation. The user watches the audience and may think what they think and see their reactions and how they act in the place. It is known that people may trust in avatars as in real life people. Riedl, R., Mohr, P., Kenning, P., Davis, F., & Heekeren, H. (2011), Pan, X., et al. (2018) As well the facial expressions of virtual characters influence human brain and facial EMG influences in decision making. Ravaja, N., Bente, G., Kätsyri, J., Salminen, M., & Takala, T. (2016). Therefore, in the light of these studies it could be assumed that the social interaction between characters and avatars exists and onwards could be assumed that at least some social interactive priming processes would work in VR like in real life. Roy, S., et al. (2003); Aarts H., et al. (2008) However, in this study the sample size is small so it possibly would give quite thin valuation of their existence in VR.

The users may experience the characters or avatars in VR as social agents and act as they were real humans and their bodily and emotional functions seem to react avatars and agent like to real humans. Cerulo, K. A. (2011)., Riedl, R., et al. (2011), Ravaja, N., et al. (2016). This could mean that this social interaction plays an important role in deepening the immersion of experiencing VR as real-life situation. As well the previous could be an important player in the experience of presence. Sanchez-Vives, M.V.; et al. (2005) This kind of finding would give higher value to VR-simulations as in this kind of usage of training of surviving and getting better performance in real-life social interaction situations.

Along Moundridou, M., et al. (2002) avatar agent can enhance the experience in their case learning experience, but they were not able to show that learning effect would have been more efficient.

2.3.1 Affective bi-directional interaction in VR on the levels of emotion and emotional state

In the study was assumed that there would be a bidirectional link in emotional state and emotions between avatars and user in simulation and into the simulation was built a functionality for that and in testing arrangement. The operation of an avatar in simulation, Tutor-avatar-figure, was built in elements of input and output between user and the avatar in simulation. It was assumed that when the user receives a visual stimulus of tutor-avatar changing a pose, the user in VR would mimic the pose. The pose is set in a way that being in presented pose would affect in users emotional state or breed a visible action which would be noticeable by watching over the user in VR by observing the user outside VR in the same real-life space. Parkinson. (2015). The question was if the user mimics or not. Then the changes in the experience of stress, anxiety of any emotion estimated/measured as self-reported interview in the qualitative interview. Pan, X., et al. (2018); Tuomi, J., et al. (2018); Stake, R. E. (2005)

In this study all of the users reported that they would have been interested in knowing how they managed in presentation situation. Three of four were interested in how their physiology, mind and body reacted during the usage of the service. Changes in in stress level, anxiety, or emotional changes in general might have been possible to notice by observing physiological changes in user. In this prototype-test it was not possible, and it will be left to future within another test-run later and into the development of the service, but outside of this study. Affecting emotional state and stress and anxiety in VR-

Simulation in this research is outlined by only in some questions in the interview and not to be measured physiologically but observing the users during the tests, but by brief questions in the interview.

Simulations built in XR open possibilities to research how external stimuluses affect in users emotional state. Affecting emotional state is easier than measuring, but measuring only a change is easier, and would give more practical. As emotional state builds as a whole of full body and mind function completeness, of which effects are built as well from full body and mind functions which then affect at first to emotional functions which then affects conscious mind and to decision making process would work differently in different persons, it might be difficult to build a solution, which would work for everyone Roy, S., et al. (2003). Therefore, in the development (further) would compile sets of emotional tools from which it might be possible to choose a personal collection, which would presumably be very personal for every user. Roy, S., et al. (2003) Stake, R. E. (2005)

2.3.2 Services using avatar characters

Avatar characters have been utilized in multiple ways to gain value to the users. Avatar character can build trust or presence or diminish presence when needed, they can build bonds to the system and the avatars can give cover for the persons real personality or they can be used to enforce users. Avatars can represent other players or not real humans; however, the avatars may be believed as real humans whether they would be A.I.-driven, however they would need to react human like and logically. Parkinson (2015); Sanchez-Vives, M.V.; et al. (2005)

2.3.3 Immersion in VR

Definition of Immersion varies with relation to what kind of solution or research or service or application or material is under examination. Ermi, L., & Mäyrä, F (2007). In this study immersion is studied as how deep is the experience of feeling of reality of the experiences, which in this case are examined in the VR-simulation of the research test set-up.

The use of larger number and amount of modalities may support deeper immersion. When the way of use of used modalities support the environment and functions that are reflected well in Virtual Reality, it is possible to gain deeper more holistic immersion. Turunen, M. (2018) Multimodal input and output may support simulations immersion of reality

strongly. Interaction becomes stronger when number of modalities in the same subject or object of interaction raises. However, it seems that more effective usage of modalities may as well support the usability of represented situation, position or state of affairs or whatever might be presented, nevertheless, the immersion may then become thinner and deplete relatively to how the representation of real-world situation changes to more like a simple user interface, this led to examining possibilities of the use of other modalities in the design and as well this led to examining how well the interactions and the VR-space should be designed and how real it should look. Ermi, L., & Mäyrä¨, F (2007). Darzentas, D., et al. (2015). Sanchez-Vives, M.V.; et al. (2005)

In VR the interfaces the surrounding and the subject may often be represented as a representation of a real-life scene with a user interface generated for the represented situation. Real life situation may not have the controls like common VR controls.

Using an interface where the user uses his/her hands as controls may deepen the immersion. E.g. the user would use own hands and see the hands in VR might deepen the immersion more, especially if the simulation would behave as in real-life. E.g. if the user grabs an object by own hands and it was possible to have an affect in the current presented surroundings and objects it may feel more natural. As well all the virtual reality must not be only digital representations real life situations. Real devices or objects may often be used simultaneously as well. In these cases, the VR as a phenomenon changes to more like of an AR system as then it needs synchronization to real life. This change of term relies and is dependent to which definition of Virtualities is in use, which makes this dependent to chosen viewpoint.

2.3.4 Estimating stress and changes in stress and emotions

In this VR-simulation estimating or detecting changes in stress and anxiety is important, because in the complete service to alleviate stress, the system's functionality is built in interaction between getting information about changes in emotional state e.g. observing changes in stress and anxiety as when the system notices emotional changes and perceives them as stress or opposite in relation to the designed interaction, the system reacts by acts that would have effects in users performance and alleviate and relieve stress or change the users mental state. Orman, E. K. (2003). In this simulation automated/computerized estimating/measuring of stress is not yet possible, but in the future and therefore emotional changes are estimated by computerized observing and then

reacted. In this study the interaction is produced by utilizing Wizard of OZ technique, which means that the actions are triggered into practice by an operator person observing the simulation-test by operator interface of VR-simulation. Pan, X., et al. (2018); Orman, E. K. (2003) . This mechanism exists for two reasons. To make test-simulation of the service possible to collect data for development of the VR-service with a prototype, that does not yet have the built-in human-computer interaction and secondly for studying if the studied phenomena exist and affect actions in observed users. In this study stress and level of anxiety examined in twofold manner. Firstly, during the test the stress and anxiety issues were estimated by observing the user and secondly, self reportedly in an interview after the test of the VR-simulation by asking a question which lead to self-reporting in this qualitative interview. Tuomi, J., et al. (2018); Stake, R. E. (2005); Orman, E. K. (2003)

Emotions and Stress level can be estimated shallowly, but well enough for practical commercial non medicative applications through observing/examining from the bodily gestures, pose and motion, speech and . It might be possible to measure stress through eye movement. A hint of stress might be possible to measure from head posture. Riskind, J. H., et al. (1982); Orman, E. K. (2003); Kuosmanen J., (2018). Estimating/measuring stress level is connected to measuring emotions; however, stress can be measured by observing changes in the level of stress hormones more precisely. Changes in physiological stress can measured or observed by monitoring physiological changes in body, for instance by monitoring iris size, heart rate, breath frequency, blood pressure, skin conductance. However, these methods would be in use in future development and research. By measuring larger number of variables will make correlations and estimation more precise, however it will be only estimation. Kuosmanen J., (2018); Tuomi, J., & Sarajärvi, A. (2018); Stake, R. E. (2005); Riskind, J. H., et al. (1982); Pan, X., et al. (2018); Orman, E. K. (2003)

2.4 Priming in the VR-simulation

Affective priming influences in cognition and behavior, and it can be triggered in nonconscious ways outside user's consciousness and conscious perception. Kiefer et al.(2018). Priming in psychology is a technique or phenomenon, which prepares a user to a stimulus without conscious guidance by the stimuli presented earlier. The stimulus is something that leads users' brain to a state in which the desired action would become more possible as the user's brain is set to a state, which is close to the action that would

be offered later. The stimulus is presented in the same modality as the forthcoming action has stronger effect in priming. Weingarten, E. , et al. (2016). Semantic and affective priming are the effects which are observed in as well cognitive and social psychology. Affective priming means preparing the users brain into action. Storbeck, J., & Clore, G. L. (2008); Aarts H., et al. (2008); Kiefer et al.(2018); Klauer, K. C., (1997)

Priming – Good vs. Bad, when measuring priming in research frames priming effect is often assumed to be good or bad and then the brain would react negatively or positively. However, this good or bad has nuances which may have more complicated meaning as how the mechanisms affect in users physiological and mental state, the emotional state and then have positive or negative effects on cognition and memory. This could be utilized in driving the user to a state in which the user would e.g. experience the previously negative situation as positive and then alleviate the stress in the situation. Of giving a presentation. Even temperature can work as a trigger in priming. - warmth and coldness may affect as warmth would be positive and coldness negative. The primes can be very personal, and this may cause a problem, which possibly could be solved with personalization of primes or just personalization by leaving the primes out that would lead to negative results. Aarts H., et al. (2008); Klauer, K. C., (1997); Weingarten, E. , et al. (2016) Kiefer et al.(2018)

2.4.1 Priming in the testing

Priming effect is used in this study for making the research's testing to bring the users to lover level of stress in the beginning of the test and as well to make the starting position of the test as similar as possible for all the tests. In this study the priming is examined as a tool to be used in setting the testers emotionally close to the similar emotional starting level and as well if the test would be repeated, then the aim would be as well to set the tester as close to the first emotional starting level of the previous test in which he/she was earlier. The stress alleviating surrounding in the beginning of VR-experience is ideated to bring the user in a state where he/she is more relieved than before starting training and when this is repeated before every time starting the Performance training the user would be primed as eased state and emotionally more relaxed this should have cognitive effect in the future when the user has been exposed to the Presentation situation more times and therefore the user might have learned that Performance might not be that bad and become relieved of his/her Stage Fright more and more. Then when the Stage Fright would be relieved, this might as well have an effect in Performance anxiety as well. Aarts H., et al. (2008)., Storbeck, J., & Clore, G. L. (2008)., Klauer K.C., (1997)

Priming can be used in preparing human to various actions from physical action to brain activities. Priming may have an effect from unconscious emotions to conscious mind. Storbeck, J., et al. (2008)., Klauer, K. C., (1997) When the user decides to train and to evaluate his/her Performance Anxiety and Stage Fright and related Stress to lower level he/she has already built a motivational state to him/herself. The goal would be clear, to alleviate his/her Performance Anxiety and Stage Fright and related Stress. Aarts, H., et al. (2008)., Storbeck, J., & Clore, G. L. (2008)., Klauer, K.C., (1997)

This kind of cognitive process and priming may have longer lasting effect as learned prime may stay effective for years. This might make possible to make cognitive changes in users' way of experiencing social situations. It could be possible to build positive triggers that would act whenever and wherever the user gives presentation as if the triggers were something that always happen before presentation, before going in front of the Stage. When training in VR-service if the user would utilize exposure training frequently repeating enough and the triggers were taught to the user it might be possible to build triggers that cause alleviation of stress in the user and would then make it easier to perform. Aarts H., et al. (2008)., Storbeck, J., et al. (2008)., Klauer, K. C., (1997); Klinger, E., et al. (2004)

3. METHODS

This chapter discusses the methods used throughout this research in a 4-fold manner. At first, it briefly concentrates on knowledge needed to design the VR-service to help Performance Anxiety. Secondly, it describes the approach selected for the present study. Thirdly it describes the development process of the VR-service, the research apparatus. Fourthly it describes the methods of data collection.

3.1 Overall simple description of combined progress of combination of design process and study process

The developed and designed and implemented VR simulation is a tool to help user in tolerating and managing Performance Anxiety and Stage freight. It offers a safe surrounding for a user to test how he/she manages in performing a talk or giving a lecture in front of audience. The service teaches being in front of audience by gaining experience, giving hints along the performance of user and giving non-concious positive cues which should help the user's being in front of the audience. Westerman, D., et al. (2015)

The design process assumes that by following users' bodily visible cues emotional state and emotions by observing changes in users bodily pose, gestures and speech tone and rate, the service offers visible cues, of which some are consciously understandable and some are not understandable like changes in brightness or changes in colours, these presented affects are supposed to have effects by affecting emotions and emotional state, of which are designed to help the user to become calmer or more attentive or more self-assured and making the situation feel more pleasant. This possible to conduct by changing affective variables of the surrounding space and by exposing the user to see affective human-figures, images and changes in soundscape and changing the brilliance and colour of lightning and shapes and colours of avatar figures. The chosen solutions were selected by choosing of which of them would be more relaxing than arousing. The selected technique in the testing set-up was the visual ques. Westerman, D., Tamborini, R., & Bowman, N. D. (2015) The service as well gives helping visible easily understandable hints through the Tutor avatar figure as it shows signs like a clock which tells how much time the user has left or that is just going well and several other information.

To build the research apparatus out of the complete VR-simulation demanded simplification through alterations and modifications to the VR-simulation, which made the apparatus simpler than a complete service, as if the testing set-up would have had too many different affective ques and changes, which would happen simultaneously at the same time, it might not have been possible to understand of which change made the action to happen and then to become observed to the observer clearly enough.

3.2 Hypothesis

Feeling of presence and immersion in Virtual Reality and the authenticity of experience, in this case, the experience of Performance Anxiety and Stage Fright and related stress are supposed to be connected together. The study examines in the light of game experience research of Ermi and Mäyrä (2007, 2011) as a case, whether the users in the VR Simulation would experience Performance Anxiety(PA) and Stage Fright(SF) and social anxiety(SA) in general, similarly as in a real-life situation, which is examined by survey and questionnaire, asking about the users subjective experience and feeling of PA, SF and SA in the VR-simulation to alleviate Performance Anxiety. Related to Ermi and Mäyrä (2007), their SCI-research questionnaire, immersion is related to how something is experienced more real-life-like if immersion is higher and immersion is related to feeling of presence, therefore the questionnaire and interview follow main ideas of the SCI-questionnaire. SCI-model and questionnaire and its variations are used to evaluate/measure and understand immersion in presented VR-simulation. (Kallio, K. P., Mäyrä, F., & Kaipainen, K. (2011); Roy, S., (2003); Sanchez-Vives, M.V.; Slater, M. (2005)

“SCI-model identifies the three key dimensions of immersion that are related to several other fundamental components, which have a role in the formation of the gameplay experience” Ermi & Mäyrä (2007). Gameplay experience is similar to the situation as in which the user is in, as it contains the relevant elements of game and play, therefore the service can be examined from its’ the relevant parts with the SCI-model presented by Ermi & Mäyrä (2007).

This testing examines presence, stress and interaction in VR, and it examines whether the experience of stressful situation is immersive. This is examined with questionnaire and an interview.

In this study stress and anxiety will be examined through lens of how stress is experienced when being in front of people in VR-Simulation compared to how the users memorize of how they experience real-life experience.

The experience of stress and anxiety and how to cope with the situation when stressed and how much stress should be tolerated is discussed in design process. As well this study will discuss how stress could be estimated/measured, what kind of methods for estimating/measuring stress exists on the other hand from point of view of designs in VR and secondly how to utilize those during the study and its processes and how the methods of measuring stress compare to each other in the study and in the performance of VR-design of the study. Orman, E. K. (2003). The presented methods will be opened to discuss of how they could be utilized into practical usage of estimating/measuring or noticing changes of emotions e.g. anxiety and stress in the future in practice. Orman, E. K. (2003).

As well this review discusses how stress could be tuned from outer input to human behavior on non-conscious and conscious affecting to emotional level related to cognition processes as well to help the user.

This study assumes that presented experiences and changes in emotional state and effects on emotions in the simulations in Virtual Reality has similarities to real-life situations and that anxiety, stress and Stage Fright would have similarities to real life which then in further development can be utilized to practice and to make possible deeper studies.

3.3 Immersion and Presence

If the users report the immersion to be very immersive, similar to real-life, the study assumes that the experience of immersion and presence to be deep.

The pre-research data showed that Immersion and Prescience are crucial in VR-simulation in presenting emotions and experiences representing interaction which is supposed to be similar to real-life interpersonal human to human interaction.

However, it is known that only small amount of elements of interaction may make user to feel that the situation would not be real interaction, and then break the immersion. Bowman, N. D., Kowert, R., & Cohen, E. (2015).

This study suggests that it would be possible that deep immersion of the experience of stress, in this case Performance anxiety and Stage Fright, may be possible to produce even

though the presented interpersonal kind human to human-avatar interaction was only unidirectional and lacked bidirectional logical humanlike interpersonal human to human interaction, although in this study especially studying this bi-directional interaction was delimited out. This lack interaction may be relevant subject in the future studies to take account or study, why it bothers only some of the users.

3.3.1 Research Questions

Is the VR experience of stress and Performance Anxiety and Stage Fright similar to real-life situation? (Interview)

Is the experience of Performance Anxiety similar to real-life situation? (Interview)

Does the user mimic the presented tutor's body-postures? (Observing)

Does the user feel/notice changes in their experience of emotional state? (Interview)

Does the user experience that he/she has a partner along on the Stage as the Tutor-avatar-figure? (Observing)

Does the user feel similar stress like in real-life, during the presentation?

How the user felt about the Tutor? (Was he/she alone on the Stage) (E.g. does emotional contagion or something similar to emotional contagion exist between the user and the tutor-avatar-figure?)

Does the user rely the changes in the body-posture of the Avatar-figure?

What is the immersion of the experience in VR comparing to real-life situation?

Does the user feel presence in the presentation situation in VR, that would represent real-life situation?

3.4 Examination and study methods: Collecting research data and data for the design process

The examination is conducted over a Virtual Reality simulation in which the user is in a position to give a speech to a public audience which does not really react on the appearance and performance of the current user, the speaker performing presentation in front of an audience. In this study, in the main tests 4 users were taking the test and interviewed. During the development process and pre study 12 users were interviewed. The study collected the primary data from interviews and surveys and through a process of observing users outside VR as the users were in action in VR-simulation, survey, questionnaire and interview. The surveys and interviews were conducted firstly before designing or building the service to support design process and afterwards to understand results and to collect data for future development and research.

The design process is connected to data gathering as well, as the process was an important driver in the design process in leading it to right direction as opening the knowledge of understanding the user and Performance Anxiety, Stage Fright and stress and then connecting them together into understandable form. As well the design process had a data collection part where interviews were conducted to understand the users and their anxiety and stress in performing situations. This data was used widely in the design process.

3.4.1 Estimating Presence and immersion the experience of stress in Virtual Reality simulation

This test examines presence, stress and interaction in VR, and it examines whether the experience of stressful situation is similar or different than in real life situation. This is examined with questionnaire and an interview. The interview and questionnaire are combination of questions to measure immersion presence and stress. Orman, E. K. (2003)

The testing application contain a tutor person, who is presented as a silhouette, Tutor-avatar-figure. The study examines whether this tutor would relieve stress of a user in presentation situation. The Tutor-avatar-figure helps the speaker, but at the same time is a non-conscious trigger to alleviating affects to the user Orman, E. K. (2003).

In the testing application, the user is set to relief kind of situation, but the virtual audience does not react to the user, the speaker. This seems to be a prohibitive to some of the users as this makes some of the users to understand that the audience is not real as there might

be an uncanny-valley problem, or the immersion and feeling of presence would fall too low on these users as Ermi, L., & Mäyrä¨, F (2007) suggested about immersion.

In this research the immersion and the user experience of VR-simulation stressful situation is measured with a questionnaire based on Bob G. Witmer and Michael J. Singers Presence questionnaire. Bob G. Witmer and Michael J. Singer. (1998). And along the SCI-questionnaire of Ermi L. &Mäyrä F. (2011) and Witmer B.& Singer M. (1998) Presentation questionnaire was generated a new questionnaire (Latva, M. Ahonen, T. and Mäkinen, J. (2018)) to measure presence and immersion along the original statements of the forms.

3.4.2 Interviews, surveys and self-reporting - Phases of qualitative interviews

The qualitative data collecting interviews were used in three Stages of the process. Firstly, to collect data for development process. Secondly for research, to evaluate the quality of the VR simulation. Thirdly for further development in the end of the testing sessions. The qualitative interviews were to collect data for further development and for research point of views at the same interviews and queries. Tuomi, J., & Sarajärvi, A. (2018)

3.4.3 Surveys and questionnaires

SCI-model and questionnaire and its variations are used to estimate/measure and understand immersion and presence in presented VR-simulation. (Kallio, K. P., Mäyrä, F., & Kaipainen, K. (2011)

“SCI-model identifies the three key dimensions of immersion that are related to several other fundamental components, which have a role in the formation of the gameplay experience.” Ermi, L. & Mäyrä, F. (2007)

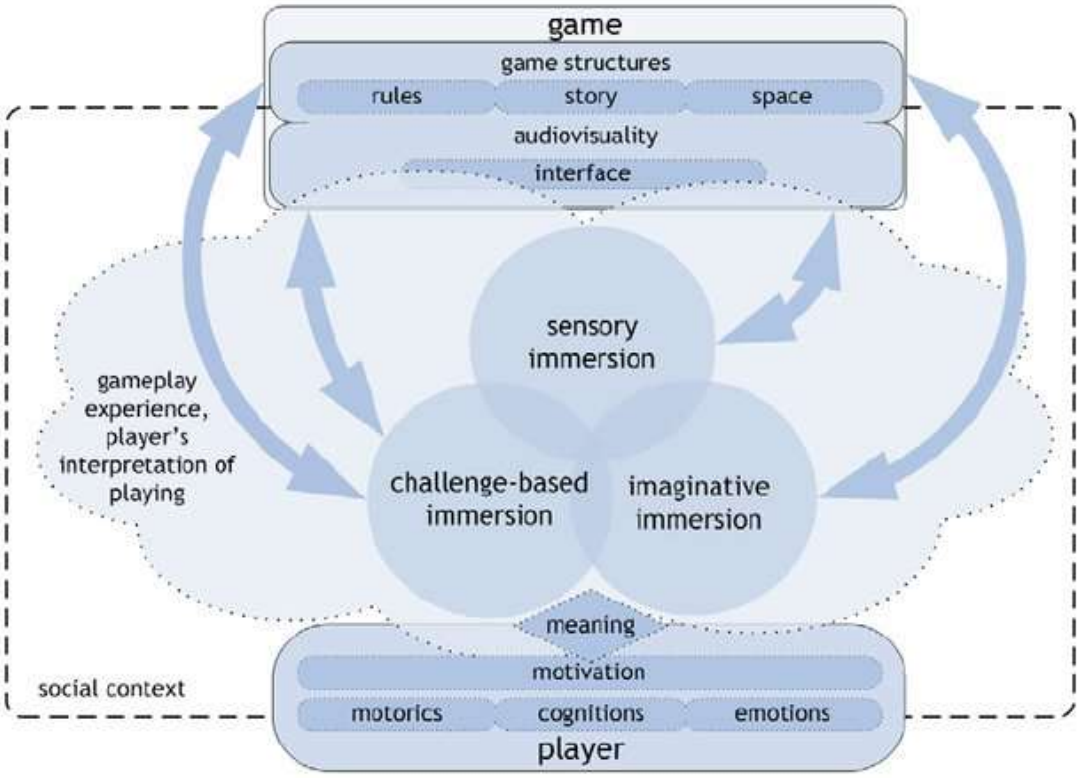

Figure 3.4.1. SCI-model Ermi, L., & Mäyrä, F (2007)
https://www.researchgate.net/profile/Frans_Maeyrae/publication/291412244/figure/fig2/AS:322788771549185@1453970248105/SCI-model-identifies-the-three-key-dimensions-of-immersion-that-are-related-to-several_W640.jpg

Measuring presence became relevant along the finding that the experience of stress seemed to be connected to feeling of presence as feeling of presence is related and connected to immersion as presented by Ermi, L., & Mäyrä¨, F (2007) and immersion seemed to be highly important in experiencing the audience in a way that being in front of the audience would inflict the raise of stress level and anxiety. Measuring and interviews are framed as well along Bob G. Witmer and Michael J. Singer's (1998) Questionnaire: "Measuring Presence in Virtual Environments: A Presence Questionnaire" is highly accepted and utilized in measuring presence.

3.4.4 Other methods of collecting data - Observing and the Wizard of Oz - method

Data about users' reactions to stimulus in VR-simulation - Users' reactions are monitored by watching the user in action in the room, where the user is carrying out the tasks being as himself/herself inside the VR experience utilizing the technique of the wizard of OZ. Pan, X., & Hamilton, Antonia F. de C. (2018). The user sees and experiences only the VR, but not the surrounding room where the observer is in. As well at the same time another observer/operator of VR system puts the stimuluses in action. As well it is desired

to get hints about the user's emotional state as the service is built in the light of using and understanding the interaction in nonconscious emotional ques, like priming effects. The stimuluses presented are a friendly avatar-figure, that helps the user in carrying out the task of performing in front of the audience. Pan, X., & Hamilton, A. F. de C. (2018). Riskind, J. H., & Gotay, C. C. (1982)

The bodily pose or posture of the tutor avatar figure changes and it is assumed, that the user would mimic the pose of the user and the user changing his/her pose would lead to quick change in emotional state. Another method was to change the colour of the tutor and to get a hint of the colour change stimulus would cause a reaction. Riskind, J. H., & Gotay, C. C. (1982). This is asked in open survey if the user would be able to tell if his/her mood would be different in the end or if he/she could realize this happening during the performance of giving the presentation. This is interesting, because this would declare a possibility that this effect exists and if these phenomena exist as a whole, then It would need further research. As followed in place by changes in users emotional state or reacting to affects seem to exist.

3.5 Design process and design evaluation process and its findings

Design process is divided in three parts, First pre-research and design evaluation and Second, actual design process and then as third part as a brief post-evaluation. In this case the actual VR-simulation aims to ease the user's Performance Anxiety e.g. Stage Fright using several presented methods.

The whole service, the commercial versions design process, an idea of complete ternary hybrid XR-Service containing Virtual Reality Service, Augmented Reality Service and Mobile Service, which would Alleviate Stage Fright and Performance Anxiety of user, originated from the previous studies and from an idea of affecting users emotional state by exposing the user to various stimulus, which would have positive effect on the user in VR presentation situation in lucid and distinct service; Need for that seems to exist. But was it possible to build this, did we have enough information? So, it is also about craving for more knowledge of how these techniques would function in VR. As well the idea for building the service emerged from a need of creating something that would help people in general and from a high interest, curiosity and fascination with the idea of relieving being in general and in the subject of using various affective cues, which would cause various effects in users mind, as a tool in interaction and understanding of the subject in

general. The services Design process and implementation process had as well other objectives as the design was built on 3 persons different objectives, the implementation group worked together, but all had their own incentives and motives. Mine was greed to gain knowledge in ideas how to utilize the forthcoming (hopefully) findings and how to utilize those into practice. And as the subject felt so interesting my incentives bred to a size to study the phenomenon as Master's thesis.

The master's thesis design process part presents a small consolidated summary of methods and instruments of emotional data measurement in testing in virtual reality as a collection. It discusses of which instruments and methods would be more appropriate to collect emotional data of user in the virtual reality presented with virtual reality headset like oculus rift or HTC Vive and with added modalities and user interfaces.

3.5.1 The pre-research and early ideating

The early ideating penetrated in human needs and in technology and it oversaw what was developed earlier in the field of alleviating MPA, PA and SF. While the problem of being scared of performing in front of an audience is extremely common there was not so many solutions yet at least in the field of VR-services. This may be due to the fact that VR-equipment cannot yet be found in so many homes or companies yet and yet they are expensive due to the price of the computer power needed to make them run properly.

The design process struggled in the beginning with a problem of answering in early stage of the development process to continue the process to right directions; How real the experience in virtual reality would feel? ; How deep are immersion and presence? ; And if feeling of Performance Anxiety and Stage Fright would exist in Virtual Reality as well and would it be similar to real-life? The early phase of the design process-built ideas from human centred approach and opened possibilities to design the design process as well as the beginning of the design process was be fuzzy as Varsaluoma, J., et al. (2015) presented in their study of the early state of experience driven design process. However, in this case it seemed quite clear that e.g. the experience drivers were quite easy to find as the qualitative interviews during the design process gave quite clear answers by utilizing qualitative research as interview study and field survey. Stake, R. E. (2005); Tuomi, J., & Sarajärvi, A. (2018).. In evaluating and iterating of those experience goals and design goals led to same findings which already seemed to be quite obvious. However, it was needed to decide some lines of the design process, like whether to build a commercial like business to consumer- product kind of solution of developing a medical

tool or a research apparatus to reach clearer data and more scientific findings. The scientific path was chosen.

In the choosing-process of experience-drivers and design drivers the process was driven to a direction, where the study and design opened out to lead to studying emotions and emotional interaction and designing that kind of interaction. As well it led to study what are the possibilities in the situation of giving a presentation to alleviate the users state and what would be the interactive emotions and how emotions and emotional-state would act, when the user suffers Performance Anxiety, Stage Fright and related stress in front of the audience and when, in which states of the giving of the presentation and why the user becomes anxious and stressed. The design process was not so fuzzy after all. Varsaluoma, J., et al. (2015).

Design process second part questions: How to adjust user's current emotions and emotional state to a direction, which would make performing easier during the performance? What would the emotion be, and emotions should act to make it easier to perform a presentation? In the current case, it was decided to go for more commercial direction in the design, but with keeping scientific knowledge and researching treatments for the disorder only so scientifically as possible to make the study possible by simplifying and keeping actions one after another instead of lateral approach..

3.5.2 Experience driven design process in the design process of SpeakerVR

The design evaluation process already follows the methods of experience driven design process with strong seasoning of design thinking. Design thinking is also needed to understand the strengths of experience driven design methods and to find the route inside the experience design method leading to VR simulation development in a manner that would drive the psychological tools utilizable and phenomena well understandable within the design process. As well, finding the right design goals and experience goals was important as early as possible already in the beginning part to get an opportunity evaluate them early enough and to see if the method would lead to positive end result. Then the design **goals** and experience goals were matched together and evaluated as well. Design thinking process was an effective tool to get quick understanding of the related problems which were found. Design thinking process were kept as scientific as possible by keeping the known knowledge and the assumed possible knowledge separate, so that it would have been most possible to know what is real and what are the things that drive the process

to separate lines. Varsaluoma, J., et al. (2015), Kaasinen, E., et al. (2015); Kleinsmann, M. S., et al. (2017); Sanders, E. B. -., & Stappers, P. J. (2008)

The main design process and design thinking process follows the methods of common human centred design with strong seasoning from design thinking and experience design as well. Experience design method was chosen as it was assumed that it would contain tools that would make possible to develop, research, examine and consider the solution from point of view, which could connect to psychology of emotions as emotion manipulation and in experience driven process together in general. This kind of design process builds on design goals. Kaasinen, E., et al. (2015).

The design goals in this process were chosen to be emotions, emotional states, moods together with experiences. However, experience designers claim, that it would not be possible to design an experience., which must be true in terms of conditions where is assumed that designing should be same for everyone, but if this demand is declined as we can design experiences or at least drive it to desired direction. The impossibility of designing experiences is stated due to an idea of nature experiences as they may be differently experienced as human experience would build on memories and experiences witnessed life through in conscious mind and lower brain level functions, e.g. emotions, moods and emotional state, together, which are different for every separate human, Kaipainen, K. (2018) Varsaluoma, J., et al. (2015)

3.5.3 Designing the tutor avatar figure – designing experience – designing emotions – alleviative messages

The service contains a tutor, who is aimed to help, guide and direct the user through the presentation training session. It is expected that the tutor would increase motivation and enhance self-efficiency in learning out of anxiety. Aarts H., Custers R., Veltkamp M. (2008); Riskind, J. H., & Gotay, C. C. (1982); The user would feel not being alone as there's a person, who's helping him/her as users might believe the avatar as real human or act with avatar as with a real human. Riedl, R., et al. (2011); Cerulo, K. A. (2011).

The tutor sends messages which help the anxiety as the pose of the tutor changes and then it is expected that the user would mimic the poses, then the mimicked poses gain self-confidence as they are poses of self-confident situations then as well the poses may breed

physiological synchronization. It is expected that the physiological synchronization would ease anxiety if the poses are breeding positive emotions to accomplish the task and help Stage Fright or Performance Anxiety. The Tutor-avatar-figure sends nonverbal visual stimulus messages. Tutor seemed to need testing, because there's a threat that the messages would breed undesirable effects or would not have any effect and the messages might need to be found as commonly affective as possible to have the expected effect on highest possible proportion of the users.

Figure 3.5.3..a. First mockup of Tutor, on this phase called moderator.
Mäkinen, J. (2018)

Figure 3.5.3.10. Avatars from the VR-simulation Latva, (2018,2019)

The tutor avatar figure is a human silhouette presenting a whole body. The stimulus of Tutor avatar figure is all presented as visual changes. The stimuli are built in the Tutor-avatar-figure as a collection of changes. Tutor's avatar figure contain variations of surface color, brightness and changes it's body-posture and simultaneously the Tutor avatar figure shows also at the same time guiding messages or removes the messages from visibility of the user when the messages are not needed, when the need for special stimuli appears or possibility to offer stimulus occurs, the Tutor avatar figure presents a stimuli. The stimuli are built to help the situation by changing the users emotional state to positive and then when everything is going well to reward the user as positive input.

However it is not known whether the non-concious ques would have affect as well or if the Tutor avatar figure would work whether in concious or non-concious levels as the

users tested seem to at least mimic the poses when they reported not to been following and seen the tutor avatar figure during the presentation. On that time, when they were not following or seeing consciously the Tutor avatar figure they yet mimicked.

The actions and affective stimulus are designed in light of cognitive psychology to teach users mind staying in appropriate state and especially not to let the presentation situation to drive the user to the fight or flight state or otherwise the user's emotional state or emotions to that direction. Riskind, J. H., & Gotay, C. C. (1982)

Inoculation message technique as Jackson, B. et al. (2017) presented can be used to reinterpret and diminish performance anxiety, and it has been in mind in the design process part of designing the Tutor-avatar-figure. This is connected to emotion contagion as well; the tutor would send messages that show how it is not stressful to perform and it is fun and Tutors body language would show how fun it is to go to the stage and be there.

3.5.4 Designing for the study: Development process leading to realize the VR service into the research apparatus

The design process had a determining driver as design had a peremptory driver to lead to a design, which would keep possibilities open to keep objects and presented situations of VR-simulation as clear as needed to make possible study relevant issues clearly enough to understand the findings. Therefore, it drove the process to the direction of designs, where the changes are presented one after another and not simultaneously to keep the research topics and objects of study in an order that would make observation of variables clear as possible. If the service was developed as a commercial product it might have led to different design solutions.

3.5.5 Understanding VR – Small brief to Techniques related to this study and design process

Along Bates-Brkljac (2012) Virtual Reality (VR) bred from "the curiosity of human to fulfil their curiosity of making voyages of exploration to the other side, to the other side of current reality Bates-Brkljac (2012)

Merriam-Webster defines Virtual reality (VR) as "an artificial environment which is experienced through sensory stimuli (such as sights and sounds) provided by a computer and in which one's actions partially determine what happens in the environment."

Virtual reality experience in virtual reality experiences are presented through sensory stimuli. Elements of experience in Virtual Reality are built on sensory perception of synthetic presentation of not-real reality, but which is plausible enough to breed a sensation, which the current user experiences as real-world experience. The virtual reality is often built on visual and auditory sensation. Bates-Brkljac (2012); Parveau, M., & Adda, M. (2018)

Virtual Reality (VR), Augmented Reality (AR) and Mixed Reality (MR) are techniques, that build a possibility to generate applications containing various synthetic realities. XR is a generic term combing the previous techniques. Virtual reality (VR) is a technique in which nothing is real, but everything looks and feels like real. In Virtual Reality the experience is completely immersive and existing completely as a complete representation of something in somewhere to be experienced completely, solely and purely in Virtual Reality. Mäyrä F. (2008).

In VR-solutions the user is brought inside the virtual model at the current moment. “Not every video you watch with a VR headset is virtual reality. VR has become the catch-all phrase for content viewed in this manner, but in actuality, VR is a fully immersive experience that transports you out of your living room or office, or wherever you are consuming the content, into a computer-generated world that you can interact with and navigate through.” Stein, Lindsay (2016); Parveau, M., & Adda, M. (2018).

In Augmented reality the digital information is experienced as a part of real world without synchronization. Diminished Reality is similar to augmented reality, but in Diminished Reality irrelevant or selected parts of real world are dissolved from real world experience. Diminished reality can be built as Augmented Reality or Mixed Reality. Parveau, M., & Adda, M. (2018).

Mixed Reality (MR) is a solution where digital information is synchronized to real world and experienced as it was organically linked to real world as a real part of real world. While defining mixed reality are faced complex matters as some definitions define it as an experience in which the user cannot know what would be real and what is virtually added and some definitions define it as it would be Mixed Reality always when real world and virtual reality are combined together whether the user would know what is the added parts or the user could not be able to recognize the added part as added. As well then Diminished reality might need an own definition and it might be important to define it similarly. In this research diminished reality is defined case by case similarly, but every time added what it would mean in certain cases. Parveau, M., & Adda, M. (2018).

Augmented reality (AR) is a technique in which something, that is not genuine sensory perceivable real object or sound, vision, or interaction through other modalities, not part of sensory perceivable existing actual world, is added to exist to real world, by a technique that adds something that really does not exist as a real world object as sensory perceivable shape or information, but after this addition it seems and feels like it belonged to the real world as something that is sensory perceivable. Stein, Lindsay. (2016). Parveau, M., & Adda, M. (2018).

Yet augmented reality with mixed/merged reality and virtual reality is already widely researched topic as it's now set to be the center of attention. The benefits of augmented reality in different actions seem already researched widely in various disciplines with different viewpoints. Focus of interest in this writing will be in the value adding benefits of AR. "Augmented reality has also received plenty of buzz this year with the advent of Pokémon Go. AR essentially inserts virtual objects into your real-world view. The phrase mixed reality is also sometimes used in this context." Stein, Lindsay. (2016)

Merged/Mixed reality is close to augmented reality. In MR the objects are virtually added to the real world contain similarities to AR, but the difference is that in MR all looks and feels like real, like the added or removed parts actually were one complete tangible perceivable existing actual world so that the user can't know which is real and which is added or removed.

This is relevant as if the Tutor-avatar-figure of the SpeakerVR presented later may involve characteristics that may be connected alleviating stress/Performance Anxiety or teach by emotion contagion in non-conscious or conscious cognitional areas behavior, which would help the user in current situation and later in similar situation. Roy, S., et al. (2003); Parveau, M., & Adda, M. (2018).

3.6 Interaction design for the VR-service and for the designed system

Interaction design has four partly separate design processes and design lines and their combination. Firstly – The interpersonal interaction design line of the VR-simulation of the user's personal interaction with the simulated people in the presentation. Secondly – The bi-directional conscious and non-conscious interaction design in between the Tutor-avatar-figure system, which is for alleviating the user in current performance situation and to teach the users body/mind to react more mildly in future. Thirdly – The techniques to make the system working and possible to test. The VR-system has its common usability

design and testing lines, Mockup, Testing during development process and main test runs. As it was not possible and needed to build real bi-directional human computer interaction, in early state it became obvious to use the Wizard of Oz technique. Pan, X., & Hamilton, Antonia F. de C. (2018).

Figure 1.11.a First detailed mockup in VR, the speaker table. Navigation buttons and the screen/pad

3.6.1 The Tutor-avatar-figure, VR's development and design – Designing to affect

The mechanisms of affecting the user rise from behavioral and cognitive theories. In vr service for the user is presented a Tutor avatar figure, who is always visible in the presentation. The Tutor is a bit out of constant focus of the user. The user may not always consciously notice or be aware of the Tutor as the Tutor is not in the middle of user's field of vision, the actor's vision, between the user and audience. As the tutor is not in the middle and the user is concentrated in the audience and giving the presentation and therefore he/she may not have so much time to observe and stare the Tutor and some changes in the Tutor figure may not present so meaningfully for the user, however the user still may act along the tutors triggering clues even though the user would not understand their meaning consciously. Peper, E., et al. (2017); Riskind, J. H., & Gotay, C. C. (1982)

The Tutor-avatar-figure contains visible, but hidden triggers that also present neutral and positive feedback for the user. The avatar and it's built in functions are studied if they have any effect on user's emotional state or if and how they affect in user. The Tutor shows information of user's performance of how well the presentation is running well. Information is given about speed of talking, time left, keeping focus on the audience and just telling that it's going well. The hidden part is that the tutor has different body-postures. When the tutor changes the body-posture the user in the vr-simulation should

mimic the posture and get the emotional state that the posture represents. The color of the Tutor avatar figure also changes along to what kind of emotion it should breed in the user. Riskind, J. H., & Gotay, C. C. (1982).

In the VR is also a speaker-desk, which is as well in the vr-simulation room as real object. The idea of this is to bring at least some haptics into the presentation to increase immersion and presence and as well to keep the user calmer as he/she can then lean on the desk as it seems to be something that calms some of public speakers, like to give something to hold on, which need was reported in design process's interviews. "It makes me feel more relaxed in the stage if there's something to grab, like something to hold on". User, man 28y., (2018). Some studies as well claim that immersion and presence would be stronger if number of modalities is higher and especially haptics is built in. Peper, E., et al. (2017); Riskind, J. H., & Gotay, C. C. (1982)

3.6.2 Priming the user to relaxed state before the performance in VR

In this VR-simulation the user is set in the relaxing surround which is assumed to change the users mood and emotional state to more relaxed as in normal real-life situation and therefore it is assumed that it would alleviate at least the first moments in front of the audience and if the user feels that moment easier than before, it may alleviate later part as well and possibly teach the users mind and body to stay calmer, which may contain meaning in light of behavioral cognition. Before the actual public speaking in front of the audience the user can wonder around in relaxing safe surrounding in a beautiful yard and hear relaxing soundscape. When the user feels ready the user can decide to leave to 2nd area, to the front of the audience. The relaxing surrounding is presented as 360°video. The 360°video is projected on inner surface of a dome in VR.

The actual implemented relaxing surround does not contain anything reminding of the next phase, the audience and the stage and the task of giving a presentation.

Figure 1.11.2.a. Screenshot of Mock-up of VR-service's Relaxing surroundings with a speaker box and presentation..

3.6.3 Emotions, cognition, perception and memory in the VR-service

The VR service has designs solutions which may have effects in user's emotions and emotional state. They are important for user's cognitional processes to help to succeed in tasks and in learning. Emotions frame the subjects to be learned, how to recall them from memory and when recalled how they affect in emotional state and as well if they are considered positive or negative of other light. As well emotional state affects on what will be possible to bring out of one's memory. This is connected to situations as well and perception and what to expect to come and then to react consciously and non-consciously to it in mind and body.

3.6.4 The presented design, making immersion more effective by adding haptics and removing haptics at the same time

Idea of having possibility of real haptics in VR-service was to breed deeper immersion and higher feeling of presence as the feeling of presence and immersion is determining to make the real-life like stress to exist as the study assumes that if the user does not feel the audience and the situation in VR to be real enough, the stress level does not raise as needed for training of Performance Anxiety and Stage Fright. The presence and immersion are in crucial role in building an experience, which would make possible to experience real-life like stress, which would be connected to interpersonal interaction, in this case with the audience. The presence and immersion are measured by a questionnaire, which is constructed on ideas of sci-questionnaire presented by Ermi L. & Mäyrä F. (2011) and a Presence Questionnaire of Witmer, Bob G. & Singer, Michael J. (1998) of measuring presence in Virtual Environments adapting the questionnaires into smaller form to correspond the needs of this study. The questionnaire was constructed by Tuomas Ahola, Jyri Mäkinen and Mikael Latva (2018). As well the interview answered to same

questions and was as well constructed adapting the SCI-questionnaire of Ermi L. & Mäyrä F. (2011) and the Presence Questionnaire of Witmer, Bob G. & Singer, Michael J. (1998). The interview questionnaire was constructed by Tuomas Ahola, Jyri Mäkinen and Mikael Latva (2018).

The VR services/simulation set-up contains real table of which behind the user stands while having the speech. This gives haptics to the service. We assume, that using real table, which the user can feel would make the immersion more real. As well assumed is that standing behind a speaker stand makes it easier to be in front of audience. Holding the table may breed higher self-confidence. Salminen, Katri (2015)

In the VR-service haptics is utilized by adding touchable objects e.g. real table in front of the user. The table is not visible through the VR-headset but is visible in VR-service and the user sees an immersion of presentation above the table. Synchronizing real life objects was difficult so therefore the presentation was seen a bit over the table, because there existed a risk of losing the controls to use the presentation e.g. to change pages. In this case where haptics to VR-service, the table, is provided as a real object and can lean and grab it, the users have reported, that leaning against a speaker-table would help anxiety as when grabbing to something and even leaning to something between the presenter and the audience would then make feeling more confident and determined, which would make the haptic considered as affective haptics. Peper, E., et al. (2017); Riskind, J. H., & Gotay, C. C. (1982).

Secondly the design process suggested to this design to be considered utilizing virtual-touch-gloves as interaction device during the development process was considered as the secondary interaction method option, because of the possibility to build affective haptics into the service, was not considered as mandatory, but from the point of view of research only causing ambiguity. This technique would have offered possibility to build interaction, emotional interaction through haptics with affective components like e.g. a possibility to stroke users' hand or other affective ques in the functionality of the Tutor-avatar-figure's alleviating technique. For testing this had to thrust out as it seemed to make the testing too complicated and would therefore, make the observation a perceiving emotional change and their reasons non-understandable. This was left to later studies.

However, multiple observation targets were not proven to be well suited and practical for this version of the service's examination. This led to decision to examine and utilize the service with the leap motion user interface. Leap motion is very fast but lacks haptics, which actually would make scientific observation easier as then the user's situation would

be easier as he/she does not need to remember and think and remember the matters of sense of touch.

Leap-motion is an intuitive 3d hand input for VR/AR, which detects hand motion in 3d space. It contains stereoscopic cameras and infrared light to detect motion. It works high speed and has not noticeable latency. However, it has no haptics, but the setup as presents gives opportunity for haptics in this VR setup.

3.6.5 VR-services and haptic interaction, the design process, testing haptics in the presented VR-simulation

An user in pre-testing claimed that: "If you see a table and lean on it and there's no physical table, it would cause you to fall or at least you will feel uncertain and it would break the immersion and make you feel like this would not be real braking the presence, which would then lead to non-stressful situation, as giving a presentation to an audience, which then would not be real either." It would mean braking the immersion; It would draw you out of the magic ring of play of Salen, K., Zimmerman, E. (2003). Lack of haptics in VR-setup weakens immersion and haptics in any form strengthens immersion. Turunen, M.,(2018).

Why haptics is important? Utilization of haptics may lead to deeper and better interaction. Interaction becomes more human-like as haptic interaction contains parts of interaction, which are deeply connected to interpersonal human behavior through neural system. Human behavior is believed to be strongly guided by emotions and moods and feelings. Emotions and feelings are parts of interaction which human interaction, human behavior and the humanity breed. Tetserukou, D., et al. (2009).

In the presented VR-setup's haptics may deepen the presence and immersion and may alleviate stress not to raise in presentation situation as the users without haptics e.g. without the real table reported that it did not feel so real because it was possible to move hands through the table which was visible in VR-presentation. Darzentas, D., et al. (2015)

The haptic objects may appear as affective actors interconnected to surrounding as kind of affective haptics if they exist for affectivity, even though they were not interpersonal; Affective haptics must not be only interpersonal and may appear elsewhere than in interpersonal communication. Tsetserukou, D., et al. (2009). Further under this subtitle, is presented how affective haptics may act as stimulus in breeding affects in this VR-simulation better, as VR-services usually lack haptics completely, however, the user often holds physical game controllers, that actually make haptics through hands impossible and

it might be possible, that the user would not realize lack of haptics as the user has a kind of haptic experience because of having the controls in hands. Salminen, Katri (2015). Having the game controllers in hands, the player may be in kind of situation, where the hands are like in kind of sensory deprivation state, which may have meaning for the experience of presence as well, but in the opposite direction by gaining immersion by hiding the scarcity from the users senses. This ambiguity is a reason why leap-motion seem to have its advantages, in this case. Leap-motion do not have built in haptics either. It might be possible that in VR, if the amount of haptics is diminished, those which are left in may appear stronger than in normal real-life complete situation.

Affective haptics is a phenomenon, where devices and systems and synthetic stimuluses enhance and elicit on human behavior through nervous system having influence through human senses. These stimuluses may have an effect to emotional state of user. Changes in emotional state can be evaluated/measured by examining and behavioral and physiological changes and estimated from other bodily variables, like body posture and movement and gestures. Tsetserukou, D., et al. (2009). Affective haptics in emotional communication. This is conducted by detecting physiological changes and physiological stimulation. The affect has the effect by stimulating senses and then effects into the brain through the nervous system. Tetserukou, D., et al. (2009), Salminen, Katri (2015)

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Figure 3.6.2.1. first mock-ups of the VR-simulation view and different UI´s

Figure 3.6.2.2. Implementation of VR-simulation

3.6.6 VR-simulation and Emotional state, Emotions, Feelings and Moods

The following explains, how emotions, emotional state and mood and affective emotional ques and stimuli connect the study and the design along with the design process, and where the design of interaction is found and where basic information in the beginning started to rose from and gained during the study, adding more knowledge. These research papers form the main part of study's reference material as well.

Emotions happen in short time, only mostly in seconds or minutes the most. Emotions manifest through triggers, which are events, people or objects. These triggers manifest emotions like happy, angry, terrifying, danger, sad angry and other emotions. Emotions are holistic to the whole organism as they affect and change state of whole body and brain. (Kuosmanen J. 2018)

Emotions are the first reaction through several triggers, that of human as a complete organism to events, people or objects. Kuosmanen J, (2018). Emotions form a two-way and multidirectional feedback loops of whole body and the brain. In brain emotions affect in neuromodulation and take place in limbic system and prefrontal cortex, where in the brain they are linked to changes in levels of neuromodulators. These neuromodulators like serotonin and dopamine level may be observable and then the change of levels of these measurable chemical values may give hints of changes in emotions. Emotions may be observable through e.g. EEG (Electroencephalogy). (Kuosmanen J, 2018)

In the body emotions appear as changes in bodily state in various levels as changes in hormone levels such as cortisol level, stress hormone, heart rate, blood pressure, heart rate, constriction or dilation of blood vessel, posture of body, sweat, muscle tension and relaxation. (Kuosmanen J, 2018). All of these for a mechanism that affect together and back and forth in arousal, physiology and behavior. The affect loop between body and emotions then affect in behavior and experience as a whole. Kuosmanen J,(2018), Peper, E., Lin, I., Harvey, R., & Perez, J. (2017) ; Riskind, J. H., & Gotay, C. C. (1982)

This basic knowledge is used in designing the research apparatus of the design and helps to understand designing the interaction, however the study's methods left simpler as the research question drives the solution to be simpler.

As Emotions are the first reaction of in an organism through the specific triggers, the feelings are representations of emotions. These experiences are representations of feelings in users conscious mind. Feelings build an experience. Feelings stay in memory; feelings can be used in future planning as they form conscious elaborations and build memories that can be presented with language. Feelings are subjective, individual and personal. Feelings appear after emotions. Kuosmanen J, (2018)

Moods are connected directly bi-directionally to emotions, but as well-connected from emotions mono-directionally through feelings to moods. Duration of moods is long term and last much longer than emotions or feelings. The duration of moods may be from days to months or in some cases even years. Moods are comprehensive affective states of whole organism. Moods affect bi-directionally on temperament and personality. Mood is more conscious state, which is affected by environment, physiology and thinking, however moods shape the feelings and how emotions are experienced, and they have an effect on how strongly the organism reacts on the triggers of emotions. Moods have an affect mostly from everything that is experienced surrounding the organism. (Kuosmanen J. 2018)

Mood is a state which is not connected to particular circumstance, state, position, people or surrounding or intention or idea. Mood is more dispassionate and have wider affect on how the organism reacts on stimuli. They shape the reactions and may filter to the experiences of feelings. Mood can be manipulated with medication or medical or physiological intervention. (Kuosmanen J. 2018)

3.7 The VR-simulation – techniques and devices

The examination is conducted over a Virtual Reality simulation in which the user is in a position to give a speech to a public audience which does not really react on the appearance and performance of the current speaker as the audience is presented by 360°video. Other objects are presented as 3d models and planes in which presented objects are projected. Sounds are presented through Oculus headset.

Figure 3.7.a. VR-headset with earphones

Figure 3.7.b,c & d. Inside of VR-service's presentation

3.7.1 The interaction system

Leap motion is a tool which tracks movement of hands almost without almost no latency, which means that the representation of hands in VR-simulation follow the movements of the user's real showing the presented hands as a real-time experience. However, if the user moves his/her hands out of sight of Leap-Motion sensor, the representation of hands in the VR-simulation will disappear, but when the hands come back to the sight of Leap-Motion's sensor, the hands will immediately appear, but the angle of when the Leap Motion sensor senses the user's hands is so wide, that out of sight of Leap-Motion sensor would mean almost the same as hands would go out of sight in real-life as well.

The functions and controls can be built on real life-like style, which lets the user use the VR-simulation use and grab objects almost like in real world. The user would interact similarly as the user would interact with real-world. However, the Leap-Motion's interaction lacs sensation of touch.

Figure 3.7.1 Leap-Motion attached to VR-gear
Picture of Leap motion hands

Touch could be brought to the user by e.g. touch-gloves in which would then make possible to build sense of touch to the objects in VR-simulation.

The presented VR-simulation is designed to run as well with the common controls of Oculus and/or HTC, but during the final tests only leap motion was used. The pre run mock-up was tested in the beginning on Oculus hand controls, but better results were gotten by using Leap-Motion interaction, which led to choosing Leap-Motion controls.

The choosing of Leap-motion means also that Leap-motion gear is not so a common gear yet and therefore it diminished the possibilities of testing over the internet distribution as the users do not often have Leap Motion, so otherwise it could have been possible to e.g. put the service as downloadable from a server with an interview over the internet and then the data would have been possible to collect more easily, however the wizard of OZ technique would have been extremely difficult to establish as scientific research set-up in testing. Pan, X., & Hamilton, Antonia F. de C. (2018). The research set-up and the VR-service would then be very different.

3.8 Design process – Inspiration for design and future directions

3.8.1 Emotions and interaction in and out – the VR-service utilizing the Wizard of OZ-method.

The wizard of OZ method means that the interaction of the service is put into action by human operator who acts as the A.I. of the digital service and triggers the interactivity into action making the simulation of the service act as if it was readier giving the user an immersion of utilizing of A.I. in presented simulations interaction. Pan, X., & Hamilton, Antonia F. de C. (2018)

The knowledge of how emotion and emotional state are utilized in designing the function into the Tutor-avatar-figure, which is expected to affect in user in the VR-service to alleviate his/her anxiety and stress and make him/her feel better and to make public performing easier every other time. The Tutor avatar figure affects in user through peripheral nervous system and with sensory nonconscious triggers and stimuli. Kiefer, M., Liegel, N., Zovko, M., & Wentura, D. (2017)

Peripheral nervous system is in a role in emotional non-conscious interaction. Peripheral nervous system combines from Sympathetic and Parasympathetic Nervous System. These are highly connected together bidirectionally. Emotional state of brain, limbic systems state affects bodily functions and bodily function affect emotional brain and then to conscious mind. Kuosmanen J. (2018)

How or if body reacts to visual stimuli, the emotional ques, and how/if emotions breed from bodily function and sensory stimuluses, is in important role in the functions of the presented VR-simulation by the Tutor-avatar?

Bodily sensory state should affect emotional brain bi-directionally. Main idea is that when the user mimics a posture, it would be a situation, when body is set or arranged or predisposed to a situation(bodily pose) which would affect emotional brain in corresponding state of bodily sensory state, bi-directionally emotional brains state would affect similarly back. Kuosmanen J. (2018)

As simplified, in the current case of VR-service's/Simulation’s alleviating techniques considering emotions and emotional state is designed as it would have affects bi-directionally holistically. Bodily state and emotional state, emotions and moods,

cognition and memory and how they affect and cognate each other is highly connected together multidirectional as it is believed that emotions occur in limbic system. Emotion-rated information are stored in limbic system. Emotions; Emotional brain prepares human organism to bodily actions like rest-digest and fight-or-flight etc. Emotional memories are stored in limbic system. From emotional brain the memories affect in bodily state in unconscious areas of mind. This then extracts information of how body should react in surrounding situations. Emotional memories are stored in brain, but they cannot be understood in conscious mind. They drive bodily functions on unconscious areas of mind. Emotional memories are drivers of emotional and bodily states that can be triggered non-consciously. These triggered states then affect on other functions like memory and cognition and behavior. These functions can be utilized various ways like driving users emotional mind and then affected to rational processes which are connected in human brain and body in both directions. The emotional brain is in unconscious areas of brain out from rational thinking; however, it plays an extremely important role in everything that happens in users conscious rational mind. Kuosmanen J. (2018), Lallemand & Koenig (2017) Kiefer, M., Liegel, N., Zovko, M., & Wentura, D. (2017)

3.8.2 Emotions for VR and for VR development – Detecting

"No single method can detect emotions reliably – a combination of methods is preferred, physiological, behavioral and experiential measures!" Kuosmanen J. (2018).

This chapter examines discrete and dimensional theories of emotion, about different methods of detecting emotions including physiological signals, visual non-verbal behaviours and subjective responses. As well it examines the advantages and limitations of detecting emotions.

Tools for tracking emotional state of body contain physiological real time measurement of body contains e.g.: measuring blood pressure, heartrate, electrical conductivity of skin, pupil size, temperature, Central nervous system could be measured: Measuring brain activity is possible with EEG (electroencephalogram), fMRI (functional magnetic resonance imaging). Measuring by injecting radioactive isotope in vein and following its travels in brain or computed tomography are rarely used in HCI. Mauss, I. B., & Robinson, M. D. (2009)

As emotions are holistic they are holistic in certain areas; psychological response, behavioral response and subjective response. In detecting emotions, the better results are

achieved if the number of used measuring methods at the same time is higher. Kuosmanen, J. (2018)

3.8.3 Design process with touch – Designing presented VR simulation

The design process had an evaluative phase in the beginning where touch played important role in gaining the feeling of presence and immersion. While designing in the evaluative prototyping phase, the prototype contained gamification through various nonconscious methods which would effect in users emotional state. Touch has an important role in social interaction, it is an important part of social interaction and it signals and receives emotional gestures. Touch is important in socio-emotional interaction. Touch is an important transmitter during life, but its meaning and use broadens during ageing as it becomes a mediator of social information and begins to be used for hedonistic experiences. Salminen, Katri (2015) The development and design process of the VR-simulation was conducted in collaboration, with Ahola, Tuomas, Mäkinen Jyri and Latva, Mikael (2018). Changes were developed by Mikael Latva in (2019).

Touch is a peripheral neural process. Darian-Smith, I. (2011). Touch is built in skin. As well skin is part of social interaction as it is a social organ. Löken, L. S., Evert, M., & Wessberg, J. (2011). Pleasantness of touch in human glabrous and hairy skin: order effects on affective ratings. Human sense of touch affects human emotional state. Tsetserukou, D., et al. (2009). Could leaning in the speaker desk or grabbing it affect in emotional level, as some of the users reported it making feeling in the stage more self-confident?

3.8.4 The visual and audible mobile VR-equipment

The VR-service is designed for Oculus Rift and HTC Vive; however, it would be quite easily changed to be able to run on other headsets as well or even with a phone. However, then the controls should be different as Leap-Motion does not currently run on mobile phones. The VR-services/simulations visual representation gear in the tests is the Oculus Rift.

4. RESULTS AND DISCUSSION

The interviews produced very qualitative data and therefore the findings and results are presented as well in qualitative manner, however the study still managed to answer most of the research questions and due to the nature of interviews thy produced data outside the research questions, which still is very usable.

This chapter presents an overview of research results in 4-fold manner. In the beginning this chapter presents the clear findings of the study. Whether the suggested phenomena exist or not and later as how the study shows that these presented effects seem to exist. Firstly, it presents the findings that arose from the qualitative interviews. Tuomi, J., & Sarajärvi, A. (2018). How it felt being in the VR and if the users had experiences of ease of stress or anxiety during the VR presentation situation. Secondly, it reveals the findings related to the research question of immersion of Performance Anxiety and presence and discusses the meanings of findings. Thirdly it reveals findings of the need and experience of relieving surrounding before the presentation, the nature experience and relaxing soundscape and possibility to decide when to go to the front of the audience to start the presentation. Fourthly, it presents the research findings and results of development process of generating and development and production phrase of the VR-service, which came into existence in examining the preliminary interviews and from pre-testing with the early design VR-mock-up. These sections are divided into subsection when needed, each of which describes each finding.

The data shows that all of the expected phenomena seem to exist, showing that it might be possible to research deeper. However, significantly larger sample size would have been needed to categorize the findings and to clarify special characteristics. The service was reported to be useful and that they would use it. The triggers and ques were answered by action.

4.1 Real-life comparing to Simulation

It seems along the interviews, that all the researched experiences, Stage Fright, Performance Anxiety and related Stress seem to be mainly similar as in real life, however one of the interviewees reported the experience of stress to be different or be missing completely.

3/4 of the test users reported “high” similarity to real-life experience of Performance Anxiety, Stage Fright and related Stress in general and the remaining 1/4, one

interviewee, reported the experience comparing to real-life to be completely different or shallow, however, this user as well reported having not experienced presence or immersion of real-life situation, and reported that to be due to lack of interpersonal real interaction with the audience, but still reported that the service would be useful in training giving speech in public and in the end told that he/she had been able to be absorbed in the situation. “I was able to absorb in the situation, as the preservation to be given was so open and I had routine in giving it.” User, (2019). The interviews show that the anxiety and stress seem to be similar and as strong as in real life situation and mainly, 3/4 of the users reported that the experience would be very similar to real-life. However, the users may have had impact in the experience as in the test-set up, there are researchers studying the situation, whether the test-user can’t see them when being inside the Virtual Reality, but they would have a feeling or knowledge of being observed, even though they are told that they are not being observed, but the performance and UX of the Virtual Reality Simulation, so, being around of the researchers would have raised the experience of anxiety or stress as the users might have thought that they might be under observation even though they were told that the service is the object of the study and not the user himself/herself. This was reported by 1/4 of the users. “Because we all were here all its raises fear of being evaluated. If I was alone I might feel more confident and non-stressful.” A test user (2019).

1/4 of the 4 users taking the test, reported that the Stress and Anxiety was nor as deep as in real-life, “I did not feel similar experience of Performance Anxiety, Stage Fright or related Stress like in real-life presentation situation as I knew that the people are not real and it left me thinking if there’s no use at all, but I decided to give it a try.”(interview, man 29y former game designer/artist). This was self-reported to be due to the reason that they were not able to immerse themselves into the VR-experience and they did not feel the presence as along the user they did not feel the audience as real people and therefore the experience lacked presence which lead to not to experience Stage Fright, Performance Anxiety or related Stress. This user as well in the presence questionnaire chose that immersion in relation to real-life situation was not deep, but shallow and reported in the interview that interaction was lacing with the audience and that tis lack of interconnection with audience, presented in VR was the problem.

Only reported possibility to feel some kind of experience of giving a performance to real people was the existence of the observing researcher. This might have happened as

Bowman, N. D., Kowert, R., & Cohen, E. (2015) presented that the user was thrown out of immersion when he/she realized that it was not real.

4.2 Immersion and Presence

The research data showed that Immersion and Prescience are crucial in VR-simulation in presenting emotions and experiences representing interaction which is supposed to be similar to real-life interpersonal human to human interaction. However, it is known that only small amount of elements of interaction may make user to feel that the situation would not be real interaction, and then brake the immersion. Bowman, N. D., et al. (2015)

This study's interviews lead to suggest that it would be possible, that deep immersion of the experience of stress, in this case Performance anxiety and Stage Fright, may be possible to produce even though the presented interpersonal kind human to human-avatar interaction was only unidirectional and lacked bidirectional logical humanlike interpersonal human to human interaction, although in this study especially studying this bi-directional interaction was delimited out. This lack interaction may be relevant subject in the future studies to take account or study, why it bothers only some of the users. Bowman, N. D., et al. (2015)

4.3 Experiences related to the Tutor-avatar-figure, Emotions and Mimicry – Body posture - Colours

By observing the users in the presentation situation showed that the users reacted in the change of body-posture of avatar figure in about 40% of the times the avatar figures body posture was changed. It seems that the users mimic the changes of body postures in VR-simulation. The users seemed to mimic the postures whether they consciously discovered the change or whether they reported that they did not realize the changes in the posture. As well they seemed to mimic the posture when they reported that they forgot to follow the figure as the presentation situation was so challenging that they did not have time to think or observe/follow the Tutor-avatar-figure. It seems that the users might mimic the changes of the body-posture reacted to it by changing own pose to different. It was not clear enough to be sure that reaction actually was mimicking. All the users seemed to mimic the postures of the Tutor-avatar-figure. The users mimicked the changes of body posture partly as only about 40% of the tutor's changes were followed, yet following the changes of user's body-posture occurred even when the user reported that they did not

feel the Virtual Reality experience as real-life like even reporting that the audience did not feel real. As well the users, who told that they did not follow the Tutor and forgot its existence, still followed the changes of Tutor-avatar-figures body posture.

Colours – observation was not clear enough to answer if it had emotional meaning or set a reaction to these changes of colour of Tutor-avatar-figure. t is not clear what kind of effect the colour changes made in user's emotions or emotional state or if it actually affected. However, the study gave an inkling of that it could have a reaction or meaning to user as it is possible, that there were change in users head-posture when changing the black-colour on Tutor-Avatar-Figure to bright coloured, but this would need more studying and re-planning in the study-technique. e.g. this might need larger number of tests, following the head movement by motion-tracking or reading micromovement of eyes or facial muscles and better self-reporting and simplifying the test.

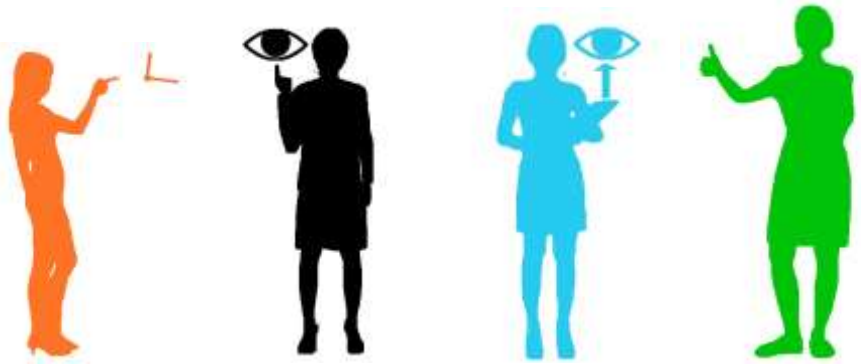

Figure 1.16.1 Tutor-avatar-figures

4.4 Relaxation surrounding

All of the interviewees reported that the relaxing surrounding was important part in alleviating stress. It was claimed to be an essential tool in giving a presentation. Users reported that relaxation before the presentation really relaxed and that it might be needed during the presentation as well as this is a study simulation and therefore that could be a good idea.

Figure 3.4.b.The first scene, the relaxing surrounding of the implemented design , without the speaker table

Figure 3.4.a.The first scene, the relaxing surrounding mock-up with the speaker table

It could not be declared if it would have cognitive affect as the tests were not repeated and it was not compared to how it would affect later in giving real public performances. This relied in priming of user to a state, which would be more useful when being in front of the audience as if Stage Fright raises before the action when the presenter waits behind the curtains, in this service the user is brought to a different situation in which this raise of Stress and Stage Fright would not happen and therefore, the user goes in front of the stage in different emotional stage, assumed as easier emotional stage, as he/she should in real-life. This might have cognitive meaning as if the user would then after exposing to relaxation be able to go in front of the audience without Stage Fright he/she might possibly experience the situation more pleasant. This might have alleviating far-reaching effects on users Stage Fright and Performance Anxiety as well.

4.5 Gamification

Utilizing gamification was fully accepted, 3/4 welcomed it as a good feature, but only as a positive gamification.

However, It was suggested (1/4) that negative gamification like not gaining enough points, was reported as negative and possibly a feature that would gain anxiety and not build confidence: “In general sense this can be used, but it should be used very carefully, how not to be so anxious, very easily negative feedback on the points, people are already anxious, and it does not build their confidence, but opposite.” Test-user (2019).

The causes of performance anxiety and stress to users along the 1st test-round interviews

The Interviewees reported that the reason to tension and anxiety is the need to give the best possible appearance and skill, which is connected to fear of failure and shame and experience of not being enough.

All the users reported as a reason to anxiety a difficulty in coping with self-criticism. This may be due to need of perfection or lower self-esteem in a situation where the user id in front or other people as they told that it would feel like being as observed as a person and the people in the audience would be judging them and their performance.

The users reported that tension, strain and pressure breed physiological effects on them.

Most of the users claimed that the situation and surrounding and lighting cause anxiety but may as well alleviate anxiety and stress.

Time of the day was mentioned; However, it was reported by users very contrary. Even the same interviewee said opposite things about time of the day having an influence in the stress, performance anxiety or Stage Fright.

In all the interviews was reported by all the users, that audience has meaning in how the anxiety or fright rise or fall. Important actors and variables in how the situations affect the stress level experienced, effective variable in audience was its size, how the audience reacts, whether the audience is familiar and if they seem to be interested in the subject.

It seems that the reasons causing Performance Anxiety and Stage Fright and Stress are very personal and vary by the user highly. Similar sets of causes were reported, but often differently.

More test data would be needed to make the findings more certain. The findings seem to be important and the theories in studying musical performance anxiety seem to support the findings, but if the data is too uncertain, it might lead to ambiguity in design solutions and would need more testing and interviewing, however, there are in the findings, some similarities to all users who experienced the situation and the experience of stress similarly, which may be useful data in the design process.

4.6 Methods reported by the interviewees to alleviate Performance Anxiety or Stage Fright or Stress

The reported methods to alleviate stage fright, stress and help performance anxiety contained high diversity. All of the interviewees experiences and methods seemed like quite different, as there were seemingly high amount of variance, therefore it was difficult to categorize the answers, as even the same answer seemed different, as there was always something that made the similar answer different, like the phase of which activity was utilized. All the interviewees had tried several methods and changing what they do to alleviate the stress, but it might need a bigger sample size to gain deeper information as all the users seemed to have so different methods and no one had a method, which they would use especially and found especially working, but gaining experience, more repeating and more performing and more time in front of the audience, as well all of them told that if they know extremely well the subject of presentation, it would alleviate stress in certain levels, but either still not similarly comparing to methods reported by the other interviewees. However, these methods they reported exist as methods the users utilize to alleviate their stress related to performing in front of the people on stage.

Training and gaining the amount of experience was reported by all (4/4) of the users to be the most important in learning giving public speeches in front of the audience.

If the user had long periods without performing to the audience the problems raised and if the user was exposed often it was easier to perform: Not having long period without performing was reported to be important by all of the users to alleviate stress and performance anxiety. If the user had long periods without performing to the audience the problems raised and if the user was exposed often it was easier to perform.

The training in front of different audiences was reported as well to be good method. Learning the subject and the presentation well enough would help, as then it would not need to fear so much, and it would gain self-confidence and self-esteem.

1/4 of the users reported that when one has not been able to give the best it would lower the self-esteem for longer period.

Mental training was one method, to think through the situation and train in mind as long as it becomes easy.

Half(2/4) of the users told that relaxing before the presentation helps performing, however half of the users talked about mental attitude and how getting right mental stand before going in front of audience was important.

4.7 The quality of the design of the VR-simulation, SpeakerVR

All of the users were interested in knowing how they managed and what areas they would need development and how they could evolve. Three of four were interested in how their physiology, mind and body reacted during the usage of the service.

For the further development the changes in in stress level, anxiety, or emotional changes in general might be possible to notice by observing physiological changes in user quite easily even with commercial gear, but it might only give a shallow data about the level, but the changes could be more observable. In this prototype-test, it was not possible, and it will be left to future within another test-run later and with the development of the service, but outside of this study.

4.7.1 The usability quality of the VR-simulation

The quality of the service was examined to support the results and findings of the study's main questions. The user satisfaction questionnaire showed that the users were extremely satisfied in the VR-simulation and its usability. All the areas were estimated as 1-5 scale. The service was reported easy to use by average of 90%. The task was reported as easy to perform (average of 85%), however in the qualitative part the giving the presentation was reported as it would have been as hard as in real life.

The visual appearance of the service was reported as pleasant by average of 90% , however in qualitative interviews the quality of the film was suggested to change to higher resolution.

The user experience with the service was reported as it was authentic by average of 90%. The service included unfamiliar/difficult terms. 5% It was easy to navigate/ move (gestures) on the VR-environment 95%. The information provided by the service is valuable to me 80%. I would like to use the service also later, average of 90%.

4.8 Future possibilities

During the design process it seemed that it might open fruitful soil to build Augmented Reality (AR) Service and Virtual Reality (VR) Service together and connect them together by an application to help people by gamifying all kinds of stress related issues in life through building the reward system of functions to affect changes to emotions and emotional state of the user. The AR version, which is designed for real life real situation would learn the user's habits in VR-training and then help the user in real-life.

4.8.1 Measuring emotions

The presented observation of emotional state or stress was utilized in providing the possibly stress alleviating and helping cues of conscious interaction of the VR-simulation, however the study was not able to answer the question related to emotional state, but only about experience of stress and anxiety and, therefore this study suggest that the ideas evaluated in the design process, measurements of psychophysiology would be in the future measured more common and traditional way by observing heart rate, heart rate variability, skin conductance, respiratory, EEG and/or MEG. This would provide better research data. Developing measurement methods would also provide data for human computer interaction. This human computer interaction opportunity would as well open new possibilities.

During the design process evaluations, it seemed that it might open fruitful soil to build Augmented Reality (AR) Service and Virtual Reality (VR) Service and an application together to help people by gamifying all kinds of things stress related issues in life through building the reward system of functions to affect changes to emotions and emotional state of the user . The AR version , which is designed for real life real situation learns the user's habits in VR-training and then help the user in real-life situations. ide possibility to build emotional bi-directional interaction to VR-services and simulations and open possibilities to collect data or even to build A.I. to alleviate stress or to effect on other emotions.

4.8.1 Facial emotion recognition as a research tool

Design process studied a possibility to read micro-emotions from muscles around eyes as it seemed to be possible with new VR-headsets containing cameras inside and some of sensors might be able to follow the muscles around user's eyes. It seemed that facial emotion recognition may have potential in VR even though face is hidden behind the VR mask. Facial micro action of muscles, micro expressions, it may be possible to read these small expressions inside the VR mask. Mouth is still visible, and it might be easy to attach a reader that reads mouth muscles. Korn, Oliver et al. (2015).

4.8.2 Repeating scientific tests - Quality and standards

Sometimes the research data may have been collected with too small sample sizes. During the prevailing moment and time in prior research , the tests may have been too complicated of too laborious or too expensive, which may have led to a situation in which the current representative sample of current examination is left too small. This may have led to uncertainty in findings of the studies, but may be possible to ensure, that the antecedent findings were correct and then secure the knowledge in terms of scientific principles. Hu, L., Bao, X., & Wang, Q. (2011)

Repeat the scientific tests might be possible to make studies more homogenic, which might make the test results more homogenic as well. Hu, L., Bao, X., & Wang, Q. (2011) It could be possible to bind the scientific findings together more reliable and easy way as a complete. Especially this could breed better way in VR-surroundings. XR, in this case VR, offers possibilities to preservation of test surrounding as they are digital and therefore preservation of test-set-ups does not need so much physical space. As well when the tests would be repeated in the used surroundings could be given to the current reproducing of certain scientific evaluation. When building VR-surroundings, building surrounding or setting the Stage for test situation does not require real life physical setups, which are expensive, and this would save resources. However, this may breed a need for standards to keep scientific exams results relevant.

5. CONCLUSION

The study gives a positive light to a possibility, that these suggested affects really exist, and it gives positive light in studying these phenomena found in future. User's Performance Anxiety and Stage Fright and Stress seem to act similarly like in real-life in most relevant areas. However, all the users may not feel and experience the situation real-enough to experience presence and immerse themselves into this another reality. This seems to happen because of the feeling of presence and immersion is not deep enough. They reported that "They knew that it is not real." Virtual Reality seems not to be experienced similarly for each user. As UX professionals sometimes keep on telling, that an experience would not be possible to design. Users would experience their experiences differently, which rose brightly up from the interviews. The users told quite similar stories, but containing always something, which would break the connection to other user's story. Why some people experience so differently may lead to a suggestion that designing an experience, which would lead in the end to similar experience would need personalization to the story-line and in what is presented and how they interact, so that it would fit every user's lifelong collection of experiences. It might be that those who would not experience the Virtual Reality experiences, might have needed different design solutions, storyline and visuality. Or possibly less time to think. Or is it opposite: Some of the users seem to experience the situation differently, not so real-life like, which was possibly due to their weaker experience of immersion and presence.

Some of the users seem to have difficulties in immersing themselves in the dreamworld of Virtual Reality, sometimes it might not be real enough or they tell, that they know that it is not real or something inside VR broke the illusion. The reason might be as well that they just don't play and therefore, the immersion never came. It might be that there are people who do not play anymore and people who play. However, as a conclusion to interviewed users who did not experience the presence were still asked the rest of the questions might lead to bias as it might be, that the experience of those who did not feel the experience of immersion, should not be answering into same collection of answers, but shared to a different group with each other and studied separately. This study was not able to answer that, who those are, and how they think, because sample-size was not enough for that. However, it's interesting, that the study actually did not aim to answer that, but still it's a fascinating problem to find out to possibly exist. However, whether one did not experience presence and immersion, yet they seemed to follow the changes in the Tutor-avatar-figure, which might mean that immersion and presence might not be

that important in all sectors of interaction. This was as well not an original research question, but yet interesting finding needing more studying to understand. Then the elements might still breed or not breed emotional affects, they may seem like left out of what was accounted in the interviews. However, this might be due to that these experiences possibly didn't exist, but it might as well had been too hard to notice the changes in emotional state as the situation might be so stressful that the experiences of emotions and changes in them might not have been so strong that the users would have reacted to those enough to memorize those. This leads to the conclusion that studying emotions need different methods. However, Playing the A.I. of the system by utilizing the Wizard of Oz technique felt like it could have been possible to offer right ques in right moments, but collecting deeper research data by utilizing the method of observing the user, who has hidden face behind the VR-mask was not accurate enough, only accurate enough to offer the ques but timing was still vague. As well, there were cues that had similar effect on separate user, whether the user would consciously watch for those Tutor avatar-figures signs or when they reported that they did not notice the ques and even did not see the Tutor, the ques still had similar looking amount of effect to the user and same number of presented actions on presented ques. Therefore, due to problems in observing users in this kind of interaction, would mean that examining emotional changes might need to utilize different methods of measuring. Study's design process suggested e.g. eye movement detection, measuring physical changes, measuring bodily movement and posture or EEG, heart-rate, skin conductance like suggested by Mauss, I. B., & Robinson, M. D. (2009).

Design study suggested to give users own avatars and instead of 1st person give the user 3rd person view. Along studies of Mancini, T., & Sibilla, F. (2017) using an avatar figure would give a possibility for the user to escape from his/her own personality. Future development idea would be to enable the user to be able to make more repetitions with lesser anxiety as the person would be further from him/herself in use 3rd person view in VR when he/she would be in Performance training. The service would utilize 3rd person view in the beginning with an avatar which would be further from users own real personality. Sioni, S. R., et al. (2017). This would give completely different approach to users own self, as social phobias, fear of failure in front of the audience, could be significantly alleviated only by user's different viewpoint. Sioni, S. R., et al. (2017). If immersion and feeling of presence in a VR-simulation was the most important in breeding of an experience resembling real-life stress, then an opposite solution, to maximize the pleasantness of the situation, might be diminishing the presence of self of the user in the

simulation. Diminishing presence might be possible without losing immersion. with various methods, which might be an idea of a second research.

Performance anxiety may breed longer lasting anxiety in the user as Mauss, I. B., & Robinson, M. D. (2009) presented. Considering studying of long-term effects in performance and stress in performing to audience would be researchable area as the study contains areas which might need more exposing to training and then measuring how the performance changes in real-life situations.

Compiling the interviews differently might have made possible the VR experience to be evaluated more deeply as this problem didn't come out in preliminary interviews and the interview seemed not to be able to describe their experience, however the study could answer whether or not the cues made any emotional effect in the user.

All of the users seemed to mimic the postures. Even the user who did not experience Stress or Performance Anxiety and reported that he/she had no immersion of real-life like situation of being in front of an audience, they still mimicked the changes of the posture of the Tutor-avatar-figure. It would need more research to know whether their emotional state would follow the ques and the research test-setup and data collecting should be designed differently.

The research data gives a positive light to a possibility that the experience would be similar enough to the real-life situation, which would give an opportunity to use of methods like desensitizing or hyposensitization the exposure of elements which cause in the VR-simulation training, by giving smaller dose of stimuli, e.g. softer load of Performance Anxiety and when the user evolves to give higher load and to teach the user to tolerate the situation and even start to experience it as pleasant or to like it, however, the previous would need more studies and testing.

The meaning of the findings of this study might be that suggested effects and phenomena seem to exist and that there are so much to study left and that the Virtual Reality seem to open new doors and reveal new rooms in human mind and new possibilities to utilize these opportunities, of which many lean in knowledge, which already was known, but was chained by the rules of reality.

REFERENCES

Aarts, H., Custers, R., & Veltkamp, M. (2008). Goal priming and the affective-motivational route to nonconscious goal pursuit. *Social Cognition, 26*(5), 555-577. doi:10.1521/soco.2008.26.5.555

Beckman, S. L., & Barry, M. (2007). Innovation as a learning process: Embedding design thinking. *California Management Review*, 50(1), 25-56. doi:10.2307/41166415

Bissonnette, J., Dubé, F., Provencher, M. D., & Moreno Sala, M. T. (2016). Evolution of music Performance Anxiety and quality of performance during virtual reality exposure training. *Virtual Reality*, 20(1), 71-81. doi:10.1007/s10055-016-0283-y

Bowman, N. D., Kowert, R., & Cohen, E. (2015). When the ball stops, the fun stops too: The impact of social inclusion on video game enjoyment. *Computers in Human Behavior, 53*, 131-139. doi: 10.16/j.chb.2015.06.036

Bouchard, S., Côté, S., St-Jacques, J., Robillard, G., & Renaud, P. (2006). Effectiveness of virtual reality exposure in the treatment of arachnophobia using 3D games. *Technology and Health Care,* 14(1), 19-27. doi:10.3233/THC-2006-14103

Cerulo, K. A. (2011). Social interaction: Do non-humans count?: Human/Non-human interaction. *Sociology Compass*, 5(9), 775-791. doi:10.1111/j.1751-9020.2011.00404.x

Darian-Smith, I. (2011). The sense of touch: performance and peripheral neural processes. *Comprehensive Physiology*, 739-788.

Darzentas, D., Brown, M., & Curran, N. (2015). Designed to thrill: Exploring the effects of multimodal feedback on virtual world immersion. Paper presented at the *, 9171* 384-395. doi:10.1007/978-3-319-21006-3_37

Dixit, S., & Prasad, R. (2017). Human bond communication: The holy grail of holistic communication and immersive experience (1st ed.). Hoboken, New Jersey: Wiley. doi:10.1002/9781119341451

Deterding, S., Dixon, D., Khaled, R., & Nacke, L. (2011). From game design elements to gamefulness: Defining "gamification". Paper presented at the 9-15. doi:10.1145/2181037.2181040

Dobos, B., Piko, B. F., & Kenny, D. T. (2019;2018;). Music Performance Anxiety and its relationship with social phobia and dimensions of perfectionism. *Research Studies in Music Education*, 41(3), 310-326. doi:10.1177/1321103X18804295

Ermi, L., & Mäyrä¨, F (2007). Fundamental components of the gameplay experience:Analysing immersion. In S. de Castell, & J. Jenson (Eds.),*Worlds in*

play: International perspectives on digital games research (pp. 37-53). New York, NY: Peter Lang Publishers.

Frings, C., & Wentura, D. (2008). Trial-by-trial effects in the affective priming paradigm. *Acta Psychologica*, 128(2), 318-323. doi:10.1016/j.actpsy.2008.03.004 https://www.sciencedirect.com/science/article/abs/pii/S0001691808000309

Garner, A. M. (2012). Performance Anxiety: Treatment options for Stage Fright. *American String Teacher*, 62(1), 34-37. doi:10.1177/000313131206200106

GRIFFITHS, N. (2013). The psychology of music Performance Anxiety by dianna T. kenny. oxford: Oxford university press, 2011. 365 pp., paperback, £34.99. ISBN: 9780199586141. *British Journal of Music Education*, 30(1), 151-152. doi:10.1017/S0265051712000526

Harris, S. R., Kemmerling, R. L., & North, M. M. (2002). Brief virtual reality therapy for public speaking anxiety. *CyberPsychology & Behavior, 5*(6), 543-550. doi:10.1089/109493102321018187

Hu, L., Bao, X., & Wang, Q. (2011). The repetition principle in scientific research. Zhong xi yi jie he xue bao= *Journal of Chinese Integrative Medicine,* 2011, *9*(9), 937-940. doi:10.3736/jcim20110903

Hughes, C. E., Nagendran, A., Dieker, L. A., Hynes, M. C., & Welch, G. F. (2015). Applications of avatar mediated interaction to teaching, training, job skills and wellness. Paper presented at the *, 8844* 133-146. doi:10.1007/978-3-319-17043-5_8

Huizinga, J. (1955). Homo ludens: A study of the play-element in culture. Boston: Beacon.

Jackson, B., Compton, J., Thornton, A. L., & Dimmock, J. A. (2017). Re-thinking anxiety: Using inoculation messages to reduce and reinterpret public speaking fears. *Plos One*, 12(1), e0169972. doi:10.1371/journal.pone.0169972

Kaasinen, E., Roto, V., Hakulinen, J., Heimonen, T., Jokinen, J. P. P., Karvonen, H., . . . Turunen, M. (2015). Defining user experience goals to guide the design of industrial systems. *Behaviour & Information Technology, 34*(10), 976-991. doi:10.1080/0144929X.2015.1035335

Kallio, K. P., Mäyrä, F., & Kaipainen, K. (2011). At least nine ways to play: Approaching gamer mentalities. *Games and Culture, 6*(4), 327-353. doi:10.1177/1555412010391089

Kenny, D. (2012). *The psychology of music Performance Anxiety*. OUP Oxford. doi:10.1093/acprof:oso/9780199586141.001.0001

Kiefer, M., Liegel, N., Zovko, M., & Wentura, D. (2017). Mechanisms of masked evaluative priming: Task sets modulate behavioral and electrophysiological priming for picture and words differentially. *Social Cognitive and Affective Neuroscience*, 12(4), 596-608. doi:10.1093/scan/nsw167

Klinger, E., Légeron, P., Roy, S., Chemin, I., Lauer, F., & Nugues, P. (2004). Virtual reality exposure in the treatment of social phobia. *Studies in Health Technology and Informatics*, 99, 91-119. doi:10.3233/978-1-60750-943-1-91

Kim, H., & Kim, S. (2016). Understanding emotional bond between the creator and the avatar: Change in behavioral intentions to engage in alcohol-related traffic risk behaviors. *Computers in Human Behavior, 62*, 186-200. doi: 10.1016/j.chb.2016.03.092

Klauer, Karl Christoph (1997) Affective Priming, *European Review of Social Psychology*, 8:1, 67-103, DOI: 10.1080/14792779643000083

Kleinsmann, M. S., Valkenburg, R., & Sluijs, J. (2017). Capturing the value of design thinking in different innovation practices. *International Journal of Design*, 11(2), 25-40.

Klimmt, C., Roth, C., Vermeulen, I., Vorderer, P., & Roth, F. S. (2012). Forecasting the experience of future entertainment technology: "interactive storytelling" and media enjoyment. *Games and Culture, 7*(3), 187-208. doi:10.1177/1555412012451123

Korn, Oliver & Boffo, Sandra & Schmidt, Albrecht. (2015). The Effect of Gamification on Emotions-The Potential of Facial Recognition in Work Environments. 9169. 10.1007/978-3-319-20901-2_46.

Kuosmanen, J. (2018) `Emotions in human computer interaction´ [Lecture power-point set], Research Group for Emotions, Sociality, and Computing, University of Tampere. A copy is in authors trust. (Downloaded and Assessed: 15 March 2018).

Lallemand & Koenig (2017), UX Needs Fulfillment Questionnaire: Lab testing beyond usability: challenges and recommendations for assessing user experiences. *Journal of Usability Studies* 12(3), 133-154.

Lee, J. R. (2014). Does virtual diversity matter?: Effects of avatar-based diversity representation on willingness to express offline racial identity and avatar customization. *Computers in Human Behavior, 36*, 190-197. doi: 10.1016/j.chb.2014.03.040

Li, D. D., Liau, A. K., & Khoo, A. (2013). Player–Avatar identification in video gaming: Concept and measurement. *Computers in Human Behavior, 29*(1), 257-263. doi: 10.1016/j.chb.2012.09.002

Li, Y., Shieh, M., Yang, C., & Zhu, L. (2018). Application of fuzzy-based hybrid taguchi method for multiobjective optimization of product form design. *Mathematical Problems in Engineering*, 2018, 1-18. doi:10.1155/2018/9091514

Lufityanto, G., Donkin, C., & Pearson, J. (2016). Measuring Intuition: Nonconscious Emotional Information Boosts Decision Accuracy and Confidence. *Psychological Science*, *27*(5), 622–634. https://doi.org/10.1177/0956797616629403

Löken E.g., Evert, L. S., M., & Wessberg, J. (2011). Pleasantness of touch in human glabrous and hairy skin: order effects on affective ratings.

Mancini, T., & Sibilla, F. (2017). Offline personality and avatar customisation. discrepancy profiles and avatar identification in a sample of MMORPG players. *Computers in Human Behavior, 69*(C), 275-283. doi: 10.1016/j.chb.2016.12.031

Mauss, I. B., & Robinson, M. D. (2009). Measures of emotion: A review. *Cognition & Emotion*, 23(2), 209-237. doi:10.1080/02699930802204677 https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2756702/

Moundridou, M., & Virvou, M. (2002). Evaluating the persona effect of an interface agent in a tutoring system. *Journal of Computer Assisted Learning, 18*(3), 253-261. doi:10.1046/j.0266-4909.2001.00237.x

Mäyrä, F. (2008). *An Introduction to Game Studies: Games in Culture.* Thousand Oaks, CA: SAGE Publications.

Nielsen, C., Studer, R. K., Hildebrandt, H., Nater, U. M., Wild, P., Danuser, B., & Gomez, P. (2018). The relationship between music Performance Anxiety, subjective performance quality and post-event rumination among music students. *Psychology of Music*, 46(1), 136-152. doi:10.1177/0305735617706539

Orman, E. K. (2003). Effect of virtual reality graded exposure on heart rate and self-reported anxiety levels of performing saxophonists. *Journal of Research in Music Education*, 51(4), 302-315. doi:10.2307/3345657

Pan, X., & Hamilton, Antonia F. de C. (2018). Why and how to use virtual reality to study human social interaction: The challenges of exploring a new research landscape. *British Journal of Psychology*, 109(3), 395-417. doi:10.1111/bjop.12290

Parveau, M., & Adda, M. (2018). 3iVClass: A new classification method for virtual, augmented and mixed realities. *Procedia Computer Science, 141*, 263-270. doi:10.1016/j.procs.2018.10.180

Parkinson. (2015). Emotions in interpersonal life: Computer mediation, modelling, and simulation. http://people.ict.usc.edu/~gratch/CSCI534/Readings/ACII-Handbook-Social.pdf

Peper, E., Lin, I., Harvey, R., & Perez, J. (2017). How posture affects memory recall and mood. Biofeedback, 45(2), 36-41. doi:10.5298/1081-5937-45.2.01

Pertaub, D. -., Slater, M., & Barker, C. (2001). An experiment on fear of public speaking in virtual reality. Paper presented at the , 81 372-378. doi:10.3233/978-1-60750-925-7-372

Poggi, Jeanine. (2016). 360-degree video is not virtual reality (and other answers to questions you're too afraid to ask). *Advertising Age* 87 (21): 19.

Rehak, B. (2003). Playing at Being: Psychoanalysis and the Avatar. In Mark J. P. Wolf & B. Perron (Eds.), *The Video Game Theory Reader* (pp. 103-127). New York, NY: Routledge.

Riskind, J. H., & Gotay, C. C. (1982). Physical posture: Could it have regulatory or feedback effects on motivation and emotion? *Motivation and Emotion*, 6(3), 273-298. doi:10.1007/BF00992249

Rizzo, A. "., Difede, J., Rothbaum, B. O., Reger, G., Spitalnick, J., Cukor, J., & Mclay, R. (2010). Development and early evaluation of the virtual Iraq/Afghanistan exposure therapy system for combat-related PTSD. *Annals of the New York Academy of Sciences,* 1208(1), 114-125. doi:10.1111/j.1749-6632.2010.05755.x

Rizzo, A., Difede, J., & Rothbaum, B. O. (2009). Virtual reality exposure therapy for combat-related PTSD. (pp. 375;1;-399;25;). Totowa, NJ: Humana Press. doi:10.1007/978-1-60327-329-9_18

Riedl, R., Mohr, P., Kenning, P., Davis, F., & Heekeren, H. (2011). Trusting humans and avatars: Behavioral and neural evidence. https://aisel.aisnet.org/icis2011/proceedings/hci/7/

Roy, S., Klinger, E., Légeron, P., Lauer, F., Chemin, I., Nugues, P., . . . Lunds universitet. (2003). Definition of a VR-based protocol to treat social phobia. *CyberPsychology & Behavior, 6*(4), 411-420. doi:10.1089/109493103322278808

Rothbaum, B.O.; Hodges, L.; Smith, S.; Lee, J.H.; Price, L.(2000) A controlled study of virtual reality exposure therapy for the fear of flying. J. Consult. Clin. Psychol. 2000, 68, 1020–1026.

Salen, K., Zimmerman, E., & Books24x7, I. (2004;2003;). Rules of play: Game design fundamentals. Cambridge (Mass.): MIT Press.

Salminen, Katri. (2015) ´Affective haptics and digital olfaction` [Lecture presentation PowerPoint set], Research Group for Emotions, Sociality, and Computing, University of Tampere. A copy is in authors trust. (Downloaded and Assessed: 15 March 2018).

Sanchez-Vives, M.V.; Slater, M. (2005) From presence to consciousness through virtual reality. Nat. Rev. *Neuroscience*., 6, 332–339.

Sanders, E. B. -., & Stappers, P. J. (2008). Co-creation and the new landscapes of design. *Codesign*, 4(1), 5-18. doi:10.1080/15710880701875068

Schajatovic, G. (2017, Feb 16). Performance Anxiety: What is it and how to combat it. Tallahassee Democrat Retrieved from https://libproxy.tuni.fi/login?url=https://search-proquest-com.libproxy.tuni.fi/docview/1868548980?accountid=14242

Sioni, S. R., Burleson, M. H., & Bekerian, D. A. (2017). Internet gaming disorder: Social phobia and identifying with your virtual self. *Computers in Human Behavior, 71*, 11-15. doi: 10.1016/j.chb.2017.01.044

Staal Mark A. (2004), Stress, Cognition and Human Performance: A Literature Review and Conceptual Framework, https://ntrs.nasa.gov/archive/nasa/casi.ntrs.nasa.gov/20060017835.pdf (visited 20190510)

Stake, R. E. (2005). Qualitative case studies. In N. Denzin & Y. S. Lincoln (Eds.), *The SAGE Handbook of Qualitative Research* (pp. 443-466). Thousand Oaks, CA: SAGE Publications.

Storbeck, J., & Clore, G. L. (2008). The affective regulation of cognitive priming. Emotion, 8(2), 208-215. http://dx.doi.org/10.1037/1528-3542.8.2.208

Sutton-Smith, B. (1997;2001;). The ambiguity of play (New ed.). Cambridge (Mass.): Harvard University Press.

Takac, M., Collett, J., Blom, K. J., Conduit, R., Rehm, I., & De Foe, A. (2019). Public speaking anxiety decreases within repeated virtual reality training sessions. *PloS One,* 14(5), e0216288. doi:10.1371/journal.pone.0216288

Tamura, H., Yamamoto, H., & Katayama, A. (2001). Mixed reality: Future dreams seen at the border between real and virtual worlds. *IEEE Computer Graphics and Applications,* 21(6), 64-70. doi:10.1109/38.963462

Tcha-Tokey, K., Christmann, O., Loup-Escande, E., Loup, G., & Richir, S. (2018). Towards a model of user experience in immersive virtual environments. *Advances in Human-Computer Interaction*, 2018, 1-10. doi:10.1155/2018/7827286 https://www.hindawi.com/journals/ahci/2018/7827286/

Tuomi, J., & Sarajärvi, A. (2018). *Laadullinen tutkimus ja sisällönanalyysi* (Uudistettu laitos. ed.). Helsinki: Tammi.

Varsaluoma, J., Väätäjä, H., Kaasinen, E., Karvonen, H., & Lu, Y. (2015, December). The fuzzy front end of experience design: Eliciting and communicating experience goals. In Proceedings of the Annual Meeting of the Australian Special Interest Group for Computer Human Interaction (pp. 324-332). ACM.

Westerman, D., Tamborini, R., & Bowman, N. D. (2015). The effects of static avatars on impression formation across different contexts on social networking sites. *Computers in Human Behavior, 53*, 111-117. doi: 10.1016/j.chb.2015.06.026

Weingarten, E., Chen, Q., McAdams, M., Yi, J., Hepler, J., & Albarracin, D. (2016). On priming action: Conclusions from a meta-analysis of the behavioral effects of incidentally-presented words. *Current Opinion in Psychology*, 12, 53-57. doi:10.1016/j.copsyc.2016.04.015

Weingarten, E., Chen, Q., McAdams, M., Yi, J , Hepler, J., Albarracín, D. & Albarracín, D. (2016). From Primed Concepts to Action. *Psychological Bulletin*, 142(5), 472–497. doi: 10.1037/bul0000030.

Vinciarelli, A., Pantic, M., & Bourlard, H. (2009). Social signal processing: Survey of an emerging domain. *Image and vision computing*, 27(12), 1743-1759. http://www.dcs.gla.ac.uk/~vincia/papers/sspsurvey.pdf

Witmer, B. G., & Singer, M. J. (1998). Measuring presence in virtual environments: A presence questionnaire. *Presence: Teleoperators and Virtual Environments,* 7(3), 225–240. https://doi.org/10.1162/105474698565686. https://nil.cs.uno.edu/publications/papers/witmer1998measuring.pdf

Yee, N., & Bailenson, J. (2007). The Proteus Effect: The Effect of Transformed Self-Representation on Behavior. *Human Communication Research, 33*(3), 271-290. doi: 10.1111/j.1468-2958.2007.00299.x

APPENDICES

Appendix 1 Questions of the design process data-collection, the background interviews, which were carried out in Finnish.

Tee haastattelu keskustellen. Pyydä täsmentämään tarvittaessa ja ohjaa haastattelu, jos löydät jonkin olennaisen asian, jota ei ole kysytty ja lisää aihe/kysymys seuraavaan haastatteluun.

Taustatutkimuskysymyksiä:

-Millaisia tuntemuksia sinussa herää, kun pidät esitystä?

-Millaiset tekijät vaikuttavat kohdallasi esiintymisjännitykseen?

-Millaiset tekijät lievittävät omalla kohdallasi esiintymisjännitystä?

-Miten esiintymisjännitys sinussa näkyy?

-Millaisia metodeja käytät (mahdolliseen) esiintymisjännityksestä pääsemiseen?

-Millaisia kokemuksia sinulla on äänen ja eleiden käytöstä esitystä pitäessäsi? (onko ollut mahdollisia ongelmia)

-Millaiset tekijät tuottavat mahdollisesti vaikeuksia katsekontaktin kannalta?

-Miten erilainen yleisö tai esiintymisympäristö on vaikuttanut esitysten pitämiseen kohdallasi?

-Miten esityksen aikarajallisuus ja ajan kuluminen vaikuttaa käyttäytymiseesi pitäessäsi esitystä?

-Millaisista asioista haluaisit tietoa/vinkkejä pitäessäsi esitystä… ja esityksen jälkeen liittyen tilanteeseen/suoritukseesi?

-Millaisia ajatuksia tulee mieleesi VR-applikaatiosta, jonka avulla poistettaisiin esiintymisjännitystä?

-Millaista palautetta kaipaisit tämän kaltaiselta VR-applikaatiolta? /Millaisia vinkkejä kaipaisit VR-ympäristössä esiintymisestä?

-Millaisia ajatuksia sinulla herää pelillisten ominaisuuksien (high scoret yms.) käytöstä VR-applikaatiossa perustuen esiintymiseen?

-Miten koet ajatustasolla mahdollisuuden katsoa rauhoittavia kuvia/musiikkia ennen esitystä?

Ahola, Mäkinen, Latva (2018)

Appendix 1.1 Pre-Questionaire – Taustahaastattelun vastaukset

Taustatutkimuskysymyksiä Taustahaastattelu 1:

Gender: N

Age: 25

Job/Education: Student (Construction architecture)

-Millaisia tuntemuksia sinussa herää, kun pidät esitystä?

”Olen huomannut, että katson liikaa, miltä ihmiset näyttävät ja mitä ihmiset ajattelevat. Sitten unohdan siinä vaiheessa ajatella omaa aihetta, jolloin tulee heitettyä lauseen vierestä jotain, mitä ei muuten ollut tarkoitus sanoa. Toisin sanoen ajatukset karkaavat yleisöön. Nykyisin osaan ottaa huumorilla, jos joku yleisöstä esimerkiksi haukottelee. Se on itsetuntoasia, millä tavoin ajattelee mitä muut miettivät esityksestä. Sitä lähtee peilaamaan, miten yleisö reagoi.”

-Miten esiintymisjännitys sinussa näkyy?

”Henki meinaa salpaantua pahimmissa tapauksissa, jos tuntuu ettei tule selviytymään esityksen läpi. “Joissain tilanteissa, joissa yleisö on vaativaa ja ei ole valmistautunut esitykseen, jännitys on suurinta. Saattaa huomata, että ääni tärisee ja hakee paikkaa esitysalueella. Pahimpia esityskertoja ovat sellaiset, kun ei ole jännittänyt alkuun, mutta ääni on mennyt kesken esityksen. Olisin tarvinnut sellaisen ”anteeksi, juon vettä hetken”. Silloin on ollut ihan kähinää koko loppuesitys, mikä oli hirveää. Jännitys riippuu yleisöstä ja päivistä. Jos aihe itselle tärkeä ja tuntuu että pitää onnistua, muttei ole valmistautunut niin silloin jännitys iskee.

-Millaiset tekijät vaikuttavat kohdallasi esiintymisjännitykseen?

”Jotkut sanovat, että mitä tutumpi ja isompi porukka, niin sitä helpompi on esiintyä. Omalla kohdallani sillä ei ole niin väliä. 6 hengen ryhmässä esiintyminen on helpointa, kun on tutustunut ihmisiin kurssin aikana. Enemmän kuin ryhmän koko niin vaikuttaa ihmisten käytös, jolloin saattaa ajatella, mitä ihmiset ajattelevat.

-Millaiset tekijät lievittävät omalla kohdallasi esiintymisjännitystä?

Hyvin nukuttu yö, valmistautuminen sekä ja että mieli on rauhallinen. Stressinhallinta, että ajattelee, että esitys nopeasti ohi. Joskus heitän esimerkiksi vitsin alkuun, jotta jää pirstoutuu.

-Millaisia metodeja käytät (mahdolliseen) esiintymisjännityksestä pääsemiseen?

”En pidä varsinaisesti harjoituksia, mutta yritän pitää levollisen mielen ja hengittää syvään.

-Millaisia kokemuksia sinulla on äänen ja eleiden käytöstä esitystä pitäessäsi? (onko ollut mahdollisia ongelmia)

” Itselläni on hyvin pitkälti paasausmetodi, että puhun yhteen putkeen aiheesta, jolloin esim. vitsin poikasella joutuu herättämään yleisöä. Joskus voisin olla aktiivisempi esiintyjä.” “Itse huomaan sen, että nojaan pöytään tai kolistelen karttakeppiä lattiaan, on sellaisia maneereja. Esitän liioitellun rentoa, vaikka jännittää sikana ja ääni menee.”

-Millaiset tekijät tuottavat mahdollisesti vaikeuksia katsekontaktin kannalta?

”Varmaan se, että jään liikaa ajattelemaan, mitä ihmisten eleet, kuten haukottelu tarkoittavat. Ettei tällöin ole liian tylsä esitys. Jään katsomaan myös, miltä porukka näyttää. Haen ruudulta (näytöltä/dioista) tukea esitykseen. Tykkään katsella yleisöä miltä näyttää, jotta näkee miten yleisö reagoi, vaikka reaktiot voivat hermostuttaa”

-Miten erilainen yleisö tai esiintymisympäristö on vaikuttanut esitysten pitämiseen kohdallasi?

”Inhoan mikkejä ja kuulla oman ääneni mikin kautta. Jään kuuntelemaan, kuinka kovaa oma ääni kuuluu tai miten hirveältä ääni kuulostaa. Oman äänen kuuleminen laittaa lisää painetta esitykseen eikä vaikuta todellakaan positiivisesti esitykseen. Kaikista paras on 30 hengen luokka, jossa hyvä akustiikka, ettei tarvitse huutaa ja normaaliäänellä pärjää selittäen ja elekieltä tukien, jolloin kädet välillä vispaavat kuin italialaisella. Tutortoiminnassa esim. ryhmäesityksissä rennon porukan kanssa tai pikkunäytelmissä ei jännitä yhtä paljon kuin koulun (AMK) esityksissä.”

-Miten esityksen aikarajallisuus ja ajan kuluminen vaikuttaa käyttäytymiseesi pitäessäsi esitystä?

“Pidän kohtuullisen lyhyitä esityksiä, mutta välillä, aiheesta riippuen, asiaa on niin paljon, että täytyy kiihdyttää loppuun. Toisaalta se helpottaa, ettei tarvitse mennä yksityiskohtiin kiireen takia. Ajan käytön kannalta huomasin, että esimerkiksi tämän päivän seminaariesityksessä aikaa oli vain 4 minuuttia puolivälissä showta”

-Millaisista asioista haluaisit tietoa/vinkkejä pitäessäsi esitystä… ja esityksen jälkeen liittyen tilanteeseen/suoritukseesi?

”Riippuu pitkälti siitä minkälaista esitystä on pitämässä. Esim. koulu järjestää vinkiksi pitchaus-juttuja ja on omasta motivaatiosta kiinni, miten jaksaa parantaa esiintymistaitoja. Uskon, että esiintymisammattilaiset voivat auttaa pääsemään esiintymisjännityksestä pois, ja siinä pitäisi olla psykologin taitoja, jotta pystyy auttamaan esiintymisjännityksestä eroon. En tiedä, johtuuko suomalaisessa kulttuurista, että esiintymiskammo on yleistä, koska meidät opetetaan niin vaatimattomaksi, että harva lapsi haluaa olla esillä. Lisäksi täällä annetaan paljon kritiikkiä esityksistä. “Itseäni helpottaa ajatus, ettei mikään esitys kaada maailmaa. Työelämää ajatellen uskon, että työyhteisö voi olla hioutunut hyvin yhteen, jolloin ei tule jännitysmomenttia. Oma esiintymisjännitys lähinnä, että sydän tykyttää ja happi loppuu”

-esityksen jälkeen palaute:

”Yleisesti kaipaan palautetta lähinnä sisällöstä. Jos harjoittelisin esiintymistä kaipaisin palautetta itse esiintymisestä. Yleensä haluan palautetta esityksen lopputuloksesta. Tietysti jos teen räikeitä virheitä tai maneereita, jotka hyppivät nenille, niistä voi mainita. Mutta mielestäni esim. tiettyjen liikkeiden jatkuva kommentointi voi olla asiatonta.

-Millaisia ajatuksia sulla tulee VR-applikaatiosta, jonka avulla poistettaisiin esiintymisjännitystä?

”Mielestäni olisi tärkeää olla yleisö, joka reagoisi ja ilmeet olisivat mahdollisimman aitoja. Jos tietää valmiiksi, että yleisö vaan möllöttää (passiivisesti) niin siitä ei ole iloa. Esimerkiksi häiriötasoa olisi keskeistä nostaa. Esim. että yleisössä joku käy vessassa tai aivastaa tai supattaa keskenään. Erityisesti, jos jotkut supattavat keskenään niin sitä jää helposti katsomaan. Elävää yleisöä ei toisaalta korvaa mikään. Toisaalta yleisöllä ei merkitystä, jos ei reagoi interaktiivisesti esiintymiseen.”

-Millaista palautetta haluaisit tämän kaltaiselta applikaatiolta:

”Mielestäni olisi tosi mielenkiintoista, jos applikaation yhteydessä olisi sykemittarit ja stressitasoa pystyttäisiin mittaamaan. Itseäni kiinnostaisi tietää, kuinka korkea syke on esityksen aikana. Lisäksi äänentaajuusmittari, jonka kautta huomaisi kohdat, joissa ääni menee heikoksi, olisi informatiivinen. Lisäksi ominaisuus, joka poimisi toistettavat sanat, kuten ”niinku”, olisi hyödyllinen. Olisi mielenkiintoista nähdä kaavio maneereista, mitä tekee kropalla, mihin kävelee ja mihin katsoo. Olisi tosi mielenkiintoista, jos järjestelmä tekisi kartan, minne on katsonut esityksen aikana.

-Virtuaalinen tuutori (peilaaminen, opetushenkilö):

”Voisi olla valinnainen osio. Kaikki eivät kaipaa sitä. Voisi olla esim. tutoriaaleja esiintymisestä. Voisi peilata jotain toista henkilöä, koska kaikki jää lihasmuistiin. Sen takia meillä on varmaan maneereja, koska on totuttu toistamaan jotain liikettä. Jos vaikka harjoittelee yhden liikkeen, se toivottavasti tulee toisen tilalle.

Millaisia VR-vinkkejä kaipaisit ympäristössä (ajankulku yms. erilaiset ympäristöt, ympäristö):

”Ajankulun ilmoittamisen kannalta olisi kaikista kamalinta, jos käytössä olisi alaspäin laskeva kello eli ei todellakaan semmoista. Se voisi olla niin, että joku yleisöstä nostaisi esim. lapun että ”5 minuuttia jäljellä” hyvissä ajoin. Olen kokenut helpottavan opinnoissa, että aikamääreet ovat olemassa, mutta kukaan ei oleta, että menee juuri siihen. Omasta mielestäni on epäoleellista kuin voi olla, että kuinka kauan esitys kestää. Se kestää sen ajan, kun on hyvä. Jos kello olisi virtuaalisessa ympäristössä, sitä voisi jäädä katsomaan liian pitkäksi aikaa.

-Millaisia ajatuksia sinulla herää pelillisten ominaisuuksien (high scoret yms.) käytöstä VR-applikaatiossa perustuen esiintymiseen?

”Periaatteessa kiinnostaisi eniten nähdä kehityskäyrä, että näkee miten paranee esityksiä pitäessä. Mielestäni kehityskäyrään riittäisi, että näyttää mihin ollaan menossa. Voisi olla niin että sen voisi klikata auki ja näkisi osatekijät, miten kehittynyt (osa-alueilla).

Kehityskäyrässä olisi hyvä näkyä puhe, eli miten paljon puheessa on turhia taukoja ja toistettavia sanoja, kuten “ää,öö, niinku”. Puheenselkeys olisi toinen kiinnostava ominaisuus. Pelillisesti sitä voisi mitata, että lähdössä on esim. 100 pistettä ja tulisi miinuspisteitä ”öö,ää, niinku” -tyylisistä täytesanoista. Lisäksi olisi kiinnostavaa, että mitattaisiin katseen paikkaa, kiertääkö se tasaisesti tai lukkiutuuko katse yhteen asiaan tai henkilöön.

Lisäksi kiinnostaa itsevarmuus, miten pysyy esiintyessä itse tasaisena ja ääni vakaana. Yksi hyvä ominaisuus voisi olla myös eleiden mittaaminen aikavälillä.

Lisäksi täytyy määritellä, mikä on oikea määrä liikkeelle, koska se ei ole hyvä, että ravaa edestakaisin, muttei myöskään, jos pysyy flegmaattisena paikallaan.”

-Miten koet ajatustasolla mahdollisuuden katsoa rauhoittavia kuvia/musiikkia ennen esitystä?

”Voisi rauhoittaa esiintymisjännitystä, erityisesti niillä, joilla jo VR-ympäristössä esiintyminen tuottaisi vaikeuksia. Vihreä rauhoittaa värinä, jota voi soveltaa esim. siten, että ympäristö olisi vihreään painottuva.

Itse aurinkoinen soliseva metsäpuro, jossa linnut laulavat taustalla, olisi rauhoittavin elementti. Siinä kohtaa ei edes kykenisi ajattelemaan esiintymisjännitystä. Toisaalta siirtymä esitykseen ei saisi olla liian yhtäkkinen. “

Gender: M
Age: 23
Student, Interactive Media

-Millaisia tuntemuksia sinussa herää, kun pidät esitystä?

Alussa kauhea jännitys, miettii saako sanottua mitä pitää. Eniten jännittää saako puhuttua mitään järkevää. Itsellä aina pää tyhjenee alussa, joten on kauhea puristaminen, että saa jotain ulos. Yleensä kuitenkin, kun esitys on pyörinyt, tapahtuu rentoutuminen ja jälkikäteen on hyvä fiilis esiintymisestä.

-Millaiset tekijät vaikuttavat kohdallasi esiintymisjännitykseen?

Oma ujous, kynnys esiintyä tuntemattomien ihmisten edessä ja sosiaalinen paine, ettei halua nolata itteään ja haluaa näyttää fiksulta ihmisten edessä.

-Millaiset tekijät lievittävät omalla kohdallasi esiintymisjännitystä?

Tuttu porukka ja tuttuja yleisössä. Mikä tahansa apukeino tukena, kuten muistilappu, diaesitys tai kaveri pitämässä esitystä. On tärkeää olla jokin tarttumapinta, jos vaikka oma muisti pettää, eli jostain saisi tukea. On tärkeää, että on jokin apuväline tukena.

-Miten esiintymisjännitys sinussa näkyy?

Ehkei elekielestä, mutta puhe on aluksi pätkivää ja tulee miettimistaukoja. Ehkä olemus saattaa olla hermostunut. Ei välttämättä näy ulkoisesti palautteen perusteella. Itsestä vaan tuntuu kauheasti, että on taukoja esiintyessä.

-Millaisia metodeja käytät (mahdolliseen) esiintymisjännityksestä pääsemiseen?

Ennen esitystä pitää olla oma rauhoittumiskeino, kuten musiikin kuuntelu matkalla esitystilaan. Joku oma tila, jossa saa rauhoittua ja olla omassa olossaan. Kaipaan omaa rauhaa ja että saan keskittyä ennen esitystä.

-Millaisia kokemuksia sinulla on äänen ja eleiden käytöstä esitystä pitäessäsi? (onko ollut mahdollisia ongelmia)

Eleitä tulee käytettyä enemmän esiintyessä kuin normaalisti puhuessa. Välillä kun on vaikea tuottaa puhetta, niin tulee tuotettua ylimääräisiä eleitä siihen päälle. Varsinkin esiintymisessä ärsyttää, että niin monologia että yleisö ei reagoi millään tavalla. Tällöin miettii onko viesti mennyt millään perille mitä sanonut ja onko saanut sanottua mitä piti, kun ei muista mitä sanonut.

Sen takia vielä enemmän tukeutuu elekieleen varmistaakseen, että joku viesti menee perille

-Millaiset tekijät tuottavat mahdollisesti vaikeuksia katsekontaktin kannalta?

Jos koittaa muistella jotain, niin yleensä ei katso silmiin, vaan otan jonkun kiintopisteen, kuten pöydänkulman, jota saatan tuijottaa. Tällöin itsellä on tyhjä katse. Jos koittaa pinnistää mitä sanoo niin saattaa katsoa muualle kuin suoraan yleisöön.

-Miten erilainen yleisö tai esiintymisympäristö on vaikuttanut esitysten pitämiseen kohdallasi?

Tutussa ympäristössä on helpompi pitää esityksiä. Ympäristö, jossa porukka on suljettu, on helpompi pitää esitystä verrattuna ympäristöön, jossa on ohikulkijoita. Pidin esitystä pelimuseossa, jolloin oli vaikea saada ihmisiä kuuntelemaan ja ihmiset kävelit esityksen ohi, mikä sai tosi epämääräisen tunteen verrattuna esim. luokkahuoneeseen, jonne ihmiset ovat tulleet esitystä varten. Helpompi siinä kohtaa pitää esitys .

-Miten esityksen aikarajallisuus ja ajan kuluminen vaikuttaa käyttäytymiseesi pitäessäsi esitystä?

Yleensä esityksissä menee aikaa enemmän kuin suunnitellut, mikä on ahdistavaa. Esim. puheviestintäkurssilla esitystä pitäessäni huomatessani kellon raksuttavan alkaa kauheasti prosessoimaan mitä ehtii sanoa. Kauhean ahdistavaa kertoa rajallisen ajan kanssa. Yleensä itsellä on liikaa sanottavaa aikaan nähden, eli on tavallaan liian hyvin varautunut.

-Millaisista asioista haluaisit tietoa/vinkkejä pitäessäsi esitystä…

Haluisin tietää meneekö sanottu perille. Yksinkertaisesti voisi olla sitä, että yleisö nyökkää, että on ymmärtänyt sen sijaan että vain tapittaa yleisössä staattisesti. Joku vuorovaikutus yleisön kanssa auttaa mua. Ja ajankäytöstä olisi hyvä saada tietoa, esim. että näkisi jostain paljon aikaa, että voi miettiä paljon käyttää mihinkin osuuteen.

ja esityksen jälkeen liittyen tilanteeseen/suoritukseesi?

Ensinnäkin liittyen sisältöön ja omaan ulosantiin. Monipuolisesti eri osa-alueista paitsi sisällöstä.

-Millaisia ajatuksia tulee mieleesi VR-applikaatiosta, jonka avulla poistettaisiin esiintymisjännitystä?

Tietokoneella tehty juttu ei välttämättä vastaa täysin oikeeta kokemusta. Voi auttaa joissain osa-alueissa esiintymisvarmuuden keräämiseksi.

-Millaista palautetta kaipaisit tämän kaltaiselta VR-applikaatiolta? /Millaisia vinkkejä kaipaisit VR-ympäristössä esiintymisestä?

Voisi olla ominaisuus, että voi pitää harjoitusesityksen ja pystyisi katsomaan yleisön näkökulmasta esitystä. Periaatteessa voisi olla esiintyjän roolissa mutta voisi katsoa omaa esitystään eri kuvakulmista yleisöstä käsin (verrattuna esim. yhteen kameraan). Näin pystyisi näkemään, että vaikka itseä jännittää, niin kamerassa sitä ei näe. Välillä vaikea kuvitella miltä oma esitys näyttää.

Äänenkäyttö ja puhumisnopeus ovat tärkeitä antaa palautetta. En tiedä puhunko jännittävässä tilanteessa liian nopeasti tai hitaasti. Jollain saattaa tulla tekstiä todella nopeaan malliin ja toinen madella. Ryhmityksestä ja äänenkäytöstä olisi mukavaa saada palautetta, sillä niitä tosi vaikea arvioida. Välillä koittaa puhua kuuluvasti ja puhe on liian hiljaista. Koska tilat ovat erilaisia ja toiset hiljaisia, tilaan sopivan äänen löytäminen voi viedä aikaa. Lisäksi mikrofonin kanssa on vaikea arvioida onko mikrofoni kaukana tai lähellä suusta.

Elekieltä voi olla vaikea arvioida, mutta katsekontakti ei välttämättä ongelma. Hyvä katsoa yleisöön, mutta hyvä ettei koko ajan tuijota ja hyvä ettei ole porautunut yhteen katsojaan. Elekieli on aika monitulkintainen asia, mutta katsekontaktia on helpompi arvioida. Toisaalta pitää huomioida esim. käyttäjät, joilla toinen silmä harottaa katsekontaktin kannalta.

-Virtuaalinen tuutori (peilaaminen, opetushenkilö):

Se voisi olla parempi kuin jos kotona opettelee peilin edessä tai kuvaa/äänittelee itseään tai katsoo opetusvideoita ja opetusoppaita. Jos VR-laseilla tuutori on vieressä opastamassa, opetus voisi olla konkreettisempaa.

Jotkut eleet voivat olla uhkaavia, kuten käsien laittaminen puuskaan tai taskuun. Näihin voisi kiinnittää huomiota ja huomauttaa. Lisäksi äänenkäyttöön voisi kiinnittää huomiota. Lisäksi jos esiintyjä on vaivaantunut ja katsoo alaspäin, niin voisi huomauttaa. Näihin

voisi kiinnittää huomiota konenäön kautta. Sillä esiintyessä nämä maneerit ei näytä hyvältä. Itse pidän käsiä puuskassa, mutta tuntuu luonnolliselta. Toisaalta siitä voi tulla eristäytynyt vaikutelma.

Teknisen toteutuksen kautta olisi hyvä, jos voisi nähdä ajan suhteessa diaesitykseen joka tukena. Jos kymmenen diaa jäljellä ja 10 minuuttia aikaa, niin olisi hyvä, jos järjestelmä ilmoittaisi, että slideihin menee liikaa aikaa, paljon on aikaa per dia ja pitäisi nopeuttaa/hidastaa tahtia. Ajankäyttöä vaikea arvioida, sillä kaikkia muistiinpanoja tule välttämättä käytyä. Lisäksi yleisön reaktiot voivat muuttaa esityksen pituutta, varsinkin jos on osallistuva yleisö, esim. että yleisö voi kysyä kesken esityksen, mikä voi muuttaa esityksen kestoa.

Ajallisena varotuksena voisi olla aikamerkki ajan loppumisesta. Jos esitys menee hyvää tahtia voisi olla vihreä valo ja kirimisen merkiksi näkyä punainen valo. Jos esim. menee liikaa aikaa diaan järjestelmä voisi näyttää punaista valoa tai jos tahti nopeutuisi, valo voisi muuttua vihreäksi. Näin järjestelmä voisi kertoa ajankohtaisesti, pysyykö esiintyjä tahdissa.

-Millaisia ajatuksia sinulla herää pelillisten ominaisuuksien (high scoret yms.) käytöstä VR-applikaatiossa perustuen esiintymiseen? (ajankulu)

Esim. jos keskittyy pelkästään äänen käyttöön, jos säilyttää hyvän äänenkäytön, joka ei rönsyile, niin sen voisi pisteyttää ja se voisi olla hyödyllinen. Tietäisi että osaa hallita tatchin, vaikka miettimistaukoja. Ajankäyttö voisi myös olla pisteytettävä ominaisuus, miten pysyy omissa aikaraameissa. Ajankäyttö vaatii aina opettelua, muttei siltikään mene nappiin. Esim. elekieli ja katsekontakti ovat vähän epämääräisiä ja eivät toimi yhtä hyvin kuin esim. tanssipeleissä. Lisäksi jos harottavat silmät, palaute voi olla tylyä.

-Miten koet ajatustasolla mahdollisuuden katsoa rauhoittavia kuvia/musiikkia ennen esitystä?

Se voisi olla hyvä. Haluan muutenkin saavuttaa oman rauhallisen tilan ennen esitystä. Jos tuollainen vaihtoehto musiikin kuunteluun, niin voisi hyvin eristäytyä lasien ja kuulokkeiden avulla rauhalliseen ympäristöön, jossa linnut lentelevät yms., niin voisi helpottaa jännitystä. Lisäksi joillain saattaa olla esityksen jälkeen kauheat tärinät niin ominaisuus voisi toimia myös loppujäähdyttelynä. Kyseessä voisi olla oma erillinen tilansa/moodinsa, esim. tietynlainen backStage ennen esiintymistä. Rauhoittumisen lisäksi voisi olla tsemppaavia elementtejä, kuten piristävän musiikin kautta, jotta saa psyykattua itsensä ennen esitystä.

Taustatutkimuskysymyksiä:

Gender: M

Age: 30

Engineer

-Millaisia tuntemuksia sinussa herää, kun pidät esitystä?

jännitys, koen pelkoa ja paniikkia

-Millaiset tekijät vaikuttavat kohdallasi esiintymisjännitykseen?

Valmistautuminen ja aihe. Hankala aihe jännittää enemmän

-Millaiset tekijät lievittävät omalla kohdallasi esiintymisjännitystä?

Hyvä valmistautuminen, tiukka känni (heh). Yksi olut voisi kyllä oikeasti auttaa, en ole ikinä kokeillu.

-Miten esiintymisjännitys sinussa näkyy?

Unohtelee mitä piti sanoa. Asioita jää sanomatta. Kädet saattavat vähän hiota.

-Millaisia metodeja käytät (mahdolliseen) esiintymisjännityksestä pääsemiseen?

En käytä kummemmin kikkoja. Ei tuu mieleen.

-Millaisia kokemuksia sinulla on äänen ja eleiden käytöstä esitystä pitäessäsi? (onko ollut mahdollisia ongelmia)

Ehkä pitäisi enemmän elehtiä.

-Millaiset tekijät tuottavat mahdollisesti vaikeuksia katsekontaktin kannalta?

En ole kovin paljon kiinnittänyt huomiota katsekontaktiin tai vaikeuksiin siihen liittyen.

-Miten erilainen yleisö tai esiintymisympäristö on vaikuttanut esitysten pitämiseen kohdallasi?

Yleisön määrä vaikuttaa ainakin ja millainen “Stage” onko iso vai pieni.

-Miten esityksen aikarajallisuus ja ajan kuluminen vaikuttaa käyttäytymiseesi pitäessäsi esitystä?

En hermoile kauheasti ajan käytöstä, kun vaan muistaa ottaa sen huomioon.

-Millaisista asioista haluaisit tietoa/vinkkejä pitäessäsi esitystä… ja esityksen jälkeen liittyen tilanteeseen/suoritukseesi?

Kaikenlaista palautetta ihan yleisesti. En osaa sanoo mitään spesifiä kyl.

-Millaisia ajatuksia tulee mieleesi VR-applikaatiosta, jonka avulla poistettaisiin esiintymisjännitystä?

Ei kai siinä mitään, kyllä kuulostaa positiiviselta, jos sellainen toimisi.

-Millaista palautetta kaipaisit tämän kaltaiselta VR-applikaatiolta? /Millaisia vinkkejä kaipaisit VR-ympäristössä esiintymisestä?

-Millaisia ajatuksia sinulla herää pelillisten ominaisuuksien (high-scoret yms.) käytöstä VR-applikaatiossa perustuen esiintymiseen?

Voishan se olla ihan ok, ainakin kokeilemisen arvonen. Kyl pelilliset ominaisuudet vois olla hyvä lisä.

-Miten koet ajatustasolla mahdollisuuden katsoa rauhoittavia kuvia/musiikkia ennen esitystä?

Nojoo, en tiedä auttaisiko, miksei.

Appendix 1.1. Presentation test script (in Finnish)

Aloitus

Hei, nimeni on … ja tässä ovat ryhmämme muut jäsenet: … . Kuinka päivä on mennyt?

Onko sinulla puhelin mukana? Pyytäisin sinua laittamaan siitä äänen ja mahdollisen värinätoiminnon pois testin ajaksi.

TESTIN ESITTELY JA TARKOITUS

Testin päämääränä on testata VR-palvelua, jonka avulla on tarkoitus lievittää esiintymisjännitystä ja helpottaa esiintymistä yleisön edessä. Testin tarkoitus on kysyä sulta mielipidettä varhaisesta käyttäjäkokemuksesta ja ominaisuuksista liittyen prototyyppiversioon palvelusta. Koska VR-palvelu on vielä kehityksessä, kaikenlainen palaute sen toimivuudesta on tärkeää. Testitilanne kestää noin 45 minuuttia.

Testitilanne videoidaan/kuvataan, sillä testi on osa Human Technology Project Work – kurssia ja Gradu työtä ja videoinnin avulla voimme analysoida testin kulkua tarkemmin jälkeenpäin. Pyydän sinulta myöhemmin vielä luvan, mutta kerron ensin, mitä testi pitää sisällään.

Testissä **ei mitenkään testata sinua** vaan testaamme tätä tuotetta. Sinun roolisi on tärkeä, kun olet täällä auttamassa meitä tutkimaan tuotteen käyttökokemusta ja käytettävyyttä.

Jos törmäät testin aikana ongelmiin, ei ole mitään syytä hämmentyä. Palvelussa on vielä useita käytettävyysongelmia, joten on tärkeää muistaa, että viat eivät ole toiminnastasi johtuvia. Näiden ongelmakohtien paikallistaminen on juuri tällaisen testaamisen tavoite, jotta ongelmia voidaan sitten korjata ja tehdä tuotteesta helpompikäyttöinen.

Muista myös, että testissä ei ole vääriä vastauksia ja kaikki löydetyt virheet sekä palaute ovat tärkeitä palvelun parantamiseksi. Myös rehelliset vastaukset palvelun käytettävyydestä ovat hyödyllisiä, joten on tärkeää muistaa, että voit antaa vapaasti kritiikkiä palvelun toimivuudesta.

TESTIN KULKU

Testin tarkoituksena on kokeilla VR-esiintymissovellusta, jonka jälkeen haastattelemme sinua lyhyesti käyttökokemukseen liittyen. Testissä tarkoituksenasi on kokeilla pitää esitys annetusta yleisestä aiheesta virtuaaliselle yleisölle käyttäen dioja aiheesta taustamateriaalina. Ennen esitystä voit lukea esitysaiheeseen liittyvät diat läpi, jotka ovat näkyvillä myös virtuaaliympäristössä. Tehtävässä ei testata lainkaan sinua, vaan tarkoitus on kerätä informaatiota käyttökokemuksesta ja mahdollisista käytön aikana ilmenneistä ongelmista. Voit esittää diat ja sisällön omin sanoin ja vapaamuotoisesti, kuten normaalisti esitystä pitäessäsi.

Testin aikana emme voi vastata kysymyksiisi, mutta voimme keskustella mielellään kysymyksiisi liittyen, kun testi on suoritettu.

Onko sinulla jotain tässä vaiheessa jotain kysyttävää testiin liittyen?

TALLENNUS

Käytettävyystesti tallennetaan videolle/kuvien muodossa, jotta voimme analysoida testin kulkua tarkemmin jälkeenpäin. Tallennettua videomateriaalia käytetään ainoastaan palvelun käytettävyyden ja käyttökokemuksen analysoimiseen.

Tallenne auttaa meitä tarkastelemaan jälkeenpäin testitilannetta ja käyttökokemusta, kun testi on ohi. Tallennemateriaali näytetään ainoastaan tutkimusryhmälle, eli meille, ja opettajalle. Kaikki löydökset raportoidaan anonyymisti.

Testissä tallennettua materiaalia käytetään ainoastaan testattavan palvelun analysoimiseen.

Nyt, kun tiedät, mitä on tulossa, pyydän virallisen tallennusluvan. Onko sinulla jotain kysyttävää?

→ ANNA LUPALOMAKE

TAUSTATIETOLOMAKE

Keräämme osallistujista muutamia taustatietoja. Voisitko täyttää tässä vaiheessa taustatietolomakkeen, jossa kysytään muutamia taustakysymyksiä.

-> ANNA TAUSTATIETOLOMAKE

Onko sinulla tässä vaiheessa kysyttävää vai aloitammeko testin varsinaisen osuuden?

ALOITETAAN TESTI

Okei, aloitamme nyt testin.

Skip-Mockup_Pre-Design:

Tämän VR-palvelun avulla on tarkoitus lievittää esiintymisjännitystä ja parantaa esiintymistaitoja virtuaalitodellisuusympäristössä harjoittelemalla esitystä virtuaalisen yleisön edessä. Testitilanteessa sulle puetaan Oculus Rift -VR-lasit ja Oculus Touch -ohjaimet. Onko VR-lasit ja ohjauskäytännöt näissä sulle tuttuja? (Jos ei: selitä lyhyesti toimintamalli/ jos on: eteenpäin)

SpeakerVR:

Tämän VR-palvelun avulla on tarkoitus lievittää esiintymisjännitystä ja parantaa esiintymistaitoja virtuaalitodellisuusympäristössä harjoittelemalla esitystä virtuaalisen yleisön edessä. Testitilanteessa sulle puetaan Oculus Rift -VR-lasit, joihin on kiinnitetty Leap Motion käsien liike trakkeri. Onko VR-lasit sinulle tutut? Entä VR-simulaatio ilman ohjaimia omin käsin käytettynä? (Jos ei: selitä lyhyesti toimintamalli/ jos on: eteenpäin)

Tässä palvelussa ohjaimina toimivat omat kädet. Vr-palvelussa näet omat kätesi 3dkuvajaisina, ehkä hieman yllättävän näköisinä. Voit käyttää ja tarttua objekteihin omin käsien VR-ympäristössä. Älä hämmästy, vaikka kätesi menisi objektien läpi, koska objektit ovat 3d malleja, niiden ei tarvitse noudattaa samoja fysiikan lakeja. Mikäli kätesi menee objektin läpi, niin voit koettaa uudestaan. Presentaatio etenee, kun kosketat kädelläsi presentaation sivua sivun oikeassa reunassa. Jos haluta takaisin päin, kosketat sivun vasenta reunaa. Ovatko tällaiset ohjauskäytännöt sinulle tuttuja (Jos edelleen ei: selitä lyhyesti toimintamalli/ jos on: eteenpäin)

Näytän sulle seuraavaksi testissä hyödynnettävän esitysaiheen. Aihe testissä on Tampere suomalaisena kaupunkina. Olemme koonneet yleistä tietoa Tampereesta kaupunkina, joista on koostettu 7 diaa (mukana aloitus- ja lopetusdia). Samat diat löytyvät myös VR-sovelluksesta ja voit käyttää dioja VR-ympäristössä esityksen tukena, kertoen järjestyksessä sisällön omilla sanoillasi tai slideja lukien, riippuen mikä tuntuu itsellesi luontaiselta.

Lisäksi viimeisissä slideissa 5 ja 6, voit kertoa esiintyessäsi omasta kokemuksestasi liittyen Tampereen nähtävyyksiin ja kulttuuriin (esimerkiksi omin sanoin, mitä ajatuksia/kokemuksia mieleesi tulee liittyen mainittuihin tai muihin nähtävyyksiin ja kulttuuriin).

VR-palvelussa on myös tuutorihahmo, joka antaa vihjeitä esityksen kulusta, informoiden jos esityksesi menee hyvin, aika loppuu, katsekontaktiin liittyen tai esityksen etenemisnopeudesta.

Näytän diat läpi ja voit lukea ne pariin otteeseen ennen esitystä.

Kun olet valmis ja lukenut diat läpi, siirrymme VR-testiin, jossa tehtävänäsi on pitää esitys aiheesta diojen avulla virtuaaliselle yleisölle.

(kun valmis, siirry vr-vaiheeseen)

(TESTIN AIKANA

Jos näet käyttäjän turhautuva, ahdistuvan, hätääntyvän tms. valitse positiivinen tutor toiminto. Huomioi, muuttaako käyttäjä asentoaan tutorin asennon mukaan!!!

Mock up:in ohjaaminen näppäimistöllä:

Tutorin pääasiallinen tila: On muutoin päällä neutraali

1=hyvin menee (positiivinen)

2=neutraali (positiivinen)

3=lisää katsekontaktia (positiivinen)

4=aika vähissä (positiivinen)

5=reilusti aikaa (positiivinen)

Tutorin toissijainen tila (neutraalissa tapauksessa)

E=lisää katsekontaktia (neutraali)

R=aika vähissä (neutraali)

T=reilusti aikaa (neutraali)

Kielen vaihto: L

-Jos osallistuja ei "ajattele ääneen", kysy "Muistathan ääneen ajattelun?" Tai äännähdä "Hmm?" Neutraaliin sävyyn

-Jos osallistuja on jumissa tehtävän kanssa, kysy "Mitä ajattelet tällä hetkellä?" Jos tilanne kestää pidempään kysy "Haluatko, että siirrymme seuraavaan osioon?" Ja muistuta että on muitakin käytettävyysongelmia, joita yritämme korjata

-Jos osallistuja ei pysy palvelussa, moderaattorin tulee ohjeistaa hänet takaisin palveluun,

-Jos osallistuja on palvelussa, mutta ei pysty suorittamaan tehtävää, moderaattori voi kysyä: "Minkä ajattelisit olevan ratkaisu?`". Jos osallistujalla yhä kestää, moderaattori voi antaa vinkin, esimerkiksi "Ehkä se löytyy … alta"

-Jos osallistuja kysyy kysymyksiä moderaattorilta, voit esittää vastakysymyksen: "Miten itse ajattelisit/toimisit tilanteessa? Moderaattori voi myös mainita, että voi vastata kysymyksiin testitilanteen jälkeen

-Muista kertoa osallistujalle, että palvelussa on useita käytettävyysongelmia, jotta käyttäjä ei tunne vikojen olevan hänen syytänsä

-Jos jotkut tehtävät alkavat ennalta määritellystä kohdasta, muista kertoa osallistujalle valmiiksi, minne hänen tulisi navigoida seuraavaksi

-Älä ole liian lähellä osallistujaa, mutta pidä kontakti osallistujaan

KYSELYLOMAKKEEN TÄYTTÖ

-> **anna hänelle kyselylomake**: Kiitos testin suorittamisesta. Ohessa on lyhyt kysely testin suorittamiseen liittyen. Collected by Ahola, Mäkinen & Latva (2018)

Appendix 1.1.1 Interview, the questions and the instructions for the observer/interviewer to the qualitative interview

As far as the interview leads the conversation to interesting direction, ask additional questions, even own ones, in order to conduct the interview to stay under relevant topics and on the other hand whether something essentially interesting comes out, the knowledge of the issue will become possible to collect data about that.

- What kind of feelings or sensations the VR-Simulation/service bred into your mind along the basis of your experience?

Would you please be more explicit?

Do you feel that the VR-simulation could:

1. *diminish Performance anxiety?*
2. *diminish Stage Fright*
3. *diminish Stress*
4. *make the training of performance better*
5. *cause changes in what you yourself experience in performing in front of the audience.*
    a. *Strain etc.?*
    b. *Why*
6. *How would you compare training performing in VR to experience of performing in front of the audience in real life situation?*
    a. *What kind of feelings or emotions did you experience during your performing in VR?*
    b. *Did you experience:*
        i. *Anxiety*
        ii. *Relief*
        iii. *Other kind of feelings?*
7. *What did the VR-surrounding/simulation/service felt like?*
    a. *Did you experience the vr-surrounding as authentic?*
    b. *Natural in performing situation?*
    c. *Visuals and sounds*
        i. *What had an effect on this?*
    d. *Did you feel performance anxiety?*

(_What was it like?

Did the performance anxiety and the feeling of stress feel like real?

How?

How well you were able to immerses and be absorbed in presentation-surrounding?

Were you absorbed in virtual performance environment?

What things had an effect in that?

How natural your gestures were in VR-simulation/service

Being in vr-simulation?

Interaction with the audience?

What were the interactivities like? How did you feel about interactivity?

Like changing the slides while having the performance

Making an eye-contact with the audience?

What was the information like?

The usefulness of the hints

Understanding of the hints?

Bring out the Tutor-avatar-figure and ask an additional question

Did you feel that the Tutor-avatar-figure was with you on the stage or were you alone or how alone you were?

Were you alone?

Did you experience feelings of stress or?

Anxiety?

Did the Tutor help you?

Did the interaction with the tutor help you?

Did you run up against problems while giving the presentation?'

What were they like?

To the end:

Do you have some development ideas or hopes in your mind along your experience?

Which would be the next development ideas for the future?

What kind of feedback would you like to have after the presentation?

During'

After

About the usage of the gamified elements?

e.g. Points from good speaking

eye-contact during the presentation

Something else?

A possibility to watch relaxing images or being in relaxing surroundings or listening to music before the presentation

Own comments or feedback

The end

Would you still have some comments or thoughts, which you'd like to tell?

Do you have something to ask about the test

Free feedback or comment?

Collected by Ahola, Mäkinen & Latva (2018)

Appendix 1.1.2 Interview, the questions and the instructions for the observer/interviewer to the qualitative interview in Finnish

Mikäli keskustelu/Haastattelu kulkee mielenkiintoiseen suuntaan kysy lisäkysymyksiä, vaikka omia, jota voit johdatella haastattelun pysymään relevanteissa aiheissa ja toisaalta mikäli jotakin erityisen kiinnostavaa tulee esille, niin saadaan siitä tietoa.

-Millaisia tuntemuksia vr-esiintymissovellus synnytti sinussa kokemuksesi pohjalta? Voitko täsmentää?

-Koetko että vr-sovellus voisi poistaa

1. *esiintymisjännitystä ja*
2. *parantaa esiintymisen harjoittelua ja*
3. *aiheuttaa muutoksia siinä mitä koet esiintymistilanteissa?*
   (Jännittäminen tms.?)
   (Miksi?)

-Miten vertaisit VR-esitysten harjoittelua oikeaan esityskokemukseen?
(-millaisia tunteita koit esityksen aikana)
(- Koitko
ahdistusta tai
helpotusta tai
muunlaisia tunteita?)

-Miltä VR-ympäristö tuntui?
Tuntuiko VR-ympäristö mielestäsi autenttiselta ja luonnolliselta esitystilanteessa?
(visuaalisuus, äänet)?
-> Mikä tähän vaikutti?
Tunsitko esiintymisjännitystä?)
(Millaista)
Tuntuiko esiintymisjännitys tai stressin tunne aidolta?)
(Miten?)

-Miten tunsit pystyväsi eläytymään virtuaaliseen esiintymisympäristöön?

(Uppouduitko virtuaaliseen esitysympäristöön?)

(Mitkä tekijät vaikuttivat?)

-Kuinka luontaisen tuntuisia eleesi mielestäsi olivat vr-ympäristössä?

(Oleminen VR-simulaatiossa?)

(Vuorovaikutus yleisön kanssa?)

-Millaisena koit interaktiivisuuden?

(kuten diojen vaihtamisen esitystä pitäessäsi.)

(katsekontaktin ottamisen yleisöön?)

-Millaisena koit informaation ja

vihjeiden hyödyllisyyden ja

niiden ymmärtämisen helppouden?

Tuo sitten esille tutor-toiminto ja kysy tästä lisäkysymys)

(Koitko Tutor hahmon olevan kanssasi mukana esiintymässä)

(Olitko kokonaan yksin?)

(Koitko stressin tai

ahdistuksen tunteita.)

(Auttoiko Tutor hahmo sinua?)

(Auttoiko vuorovaikutus tutor-hahmon kanssa sinua?)

-Kohtasitko ongelmakohtia esitystä pitäessäsi?

(Millaisia nämä olivat?)

-Loppuun: Tuleeko mieleesi kehitysideoita tai toiveita kokemuksesi pohjalta (kysy mielipidettä seuraavista jatkokehitysideoista):

- *Millaista palautetta haluaisit esityksestäsi*
  - *(aikana/jälkeen)?*
- *Pelillisten elementtien käytöstä,*
  - *esim. pisteet tasaisesta puheesta tai*
  - *katsekontaktista esityksen aikana?*
- *Mahdollisuus katsoa rauhoittavia kuvia/kuunnella musiikkia ennen esitystä?*

-Vapaa palaute/kommentit:

LOPETUS

Onko sinulla vielä jotain kommentteja tai ajatuksia, joita haluat kertoa?

Jäikö sinulle testistä jotain kysyttävää?

Collected by Ahola, Mäkinen & Latva (2018)

Appendix 2. Interview – open interview questions to lead the talk – Script

HAASTATTELU – SpeakerVR

Seuraavaksi siirrytään haastatteluun ja kysyn sinulta lyhyesti mielipidettäsi VR-palvelun käyttökokemuksesta.

-Millaisia tuntemuksia vr-esiintymissovellus synnytti sinussa kokemuksesi pohjalta? Voitko täsmentää?

-Koetko että vr-sovellus voisi poistaa

4. *esiintymisjännitystä ja*
5. *parantaa esiintymisen harjoittelua ja*
6. *aiheuttaa muutoksia siinä mitä koet esiintymistilanteissa?*
   (Jännittäminen tms.?)
   (Miksi?)

-Miten vertaisit VR-esitysten harjoittelua oikeaan esityskokemukseen?
(-millaisia tunteita koit esityksen aikana)
(- Koitko
ahdistusta tai
helpotusta tai
muunlaisia tunteita?)

-Miltä VR-ympäristö tuntui?
Tuntuiko VR-ympäristö mielestäsi autenttiselta ja luonnolliselta esitystilanteessa?
(visuaalisuus, äänet)?
-> Mikä tähän vaikutti?
Tunsitko esiintymisjännitystä?)
(Millaista)
Tuntuiko esiintymisjännitys tai stressin tunne aidolta?)
(Miten?)

-Miten tunsit pystyväsi eläytymään virtuaaliseen esiintymisympäristöön?

(Uppouduitko virtuaaliseen esitysympäristöön?)

(Mitkä tekijät vaikuttivat?)

-Kuinka luontaisen tuntuisia eleesi mielestäsi olivat vr-ympäristössä?

(Oleminen VR-simulaatiossa?)

(Vuorovaikutus yleisön kanssa?)

-Millaisena koit interaktiivisuuden?

(kuten diojen vaihtamisen esitystä pitäessäsi.)

(katsekontaktin ottamisen yleisöön?)

-Millaisena koit informaation ja

vihjeiden hyödyllisyyden ja

niiden ymmärtämisen helppouden?

Tuo sitten esille tutor-toiminto ja kysy tästä lisäkysymys)

(Koitko Tutor hahmon olevan kanssasi mukana esiintymässä)

(Olitko kokonaan yksin?)

(Koitko stressin tai

ahdistuksen tunteita.)

(Auttoiko Tutor hahmo sinua?)

(Auttoiko vuorovaikutus tutor-hahmon kanssa sinua?)

-Kohtasitko ongelmakohtia esitystä pitäessäsi?

(Millaisia nämä olivat?)

-Loppuun: Tuleeko mieleesi kehitysideoita tai toiveita kokemuksesi pohjalta (kysy mielipidettä seuraavista jatkokehitysideoista):

- *Millaista palautetta haluaisit esityksestäsi*
  - *(aikana/jälkeen)?*
- *Pelillisten elementtien käytöstä,*
  - *esim. pisteet tasaisesta puheesta tai*
  - *katsekontaktista esityksen aikana?*
- *Mahdollisuus katsoa rauhoittavia kuvia/kuunnella musiikkia ennen esitystä?*

-Vapaa palaute/kommentit:

LOPETUS

Onko sinulla vielä jotain kommentteja tai ajatuksia, joita haluat kertoa?

Jäikö sinulle testistä jotain kysyttävää?

Kiitos oikein paljon osallistumisesta!

Collected by Ahola, Mäkinen & Latva (2018)

Appendix 2.1 Interview: VR-simulation Main test, Interview transcript 1.

Haastattelu 1. VR-simulation Pro_Haastattelu 1. Litteroitu 20190518

1. Yllättävän autenttinen se oli, esiintymisjännitystäkin oli samalla tavalla, kuin olis mennyt täysin valmistelematta luokan eteen, se sama jännitys oli, hyvin autenttinen kokemus, tuntui uskottavalta, Äänen looppaus huomattiin, Aluksi oli shokeeraava ja tuntui että nyt mennään.

2. Voisi toimia ramppikuumeen lievittäjänä, mutta sit jos on joku pidempi esitys niin sit ei ehkä kohtaa, ja yleisöstä yleensä saattaa joku kysyä ja jos on vain vähän esiintynyt, niin voi laskee kynnystä.

3. Mitä nyt lyhyen aikaa ehti perehtyä niin selkeä vertailukohta oli, että ei ollut niin interaktiivista ja katsekontakti puuttui ja huomaa että joku kuuntelee ja joku tylsistyy, ai varmaan ihan oikeaa tilannetta voi duplikoida, mutta varmasti työkalua voisi toimia toimivana ratkaisuna.

4.Joo joot tuntui, erityisesti alkumaisema, ja kun parempi reso niin voi tulla vielä tuntuvampi, ja kun ihmisten liikkeet eivät toistu niin todentuntuisuus lisääntyy ja tuli katseltua minkälaisia ihmisiä siellä oli, jos olisi ollut elävä yleisö niin olisin pyytäny tulemaan hiljempaa.

5. Joo pystyy eläytymään interaktiivisuus olisi vielä immersiivisempi, kun vuorovaikutus puuttui ja alkuhuuman jälkeen huomasi, että puhuu tyhjille seinille, jos asennoituu että tämä on työkalu niin käy paremmin, Puheen harjoittelussa olisi tärkeää yleisön reagoinnin huomiointi, vähän jää jotain puuttumaan, mut jos asennoituu, niin on elävä kokemus.

6. Kun oli pöntön takana niin kädet ja eleet pöntön takana kädet ja eleet olivat onnistuneita, miten kävely vaikuttaisi, jos vaikka vertaa Ted puheisiin, niin jengi kävelee ja purkaa stressiä esim. kävelemällä. Kohtasi mitä ennakkoon odottikin.

7. No siinä yhden dian hyppäsin yli ja sit improvisoin, mut pääsin palaamaan aluksi ei toiminut mutta sitten jos ei toimi niin missä sit olisi ongelma voisiko olla oikeastikin, jos olisi oikea pönttö, ei mitään fataalia ja pääse eteen ja taakse nii kuin odottikin, mut jos olis interaktiivinen tapahtuma niin saisi enemmän irti.

8. No kyl sen figuurin huomas, kun se kannusti et hyvin menee. Vaikutti ohjelmoidulta, kun kannusti jo etukäteen ennen kuin oli aloittanut, vois olla vaikka joku leijuva pinni, voisi olla mikä vaan muukin hahmo mikä siellä sitten leijuisi. Kyl pelitti hyvin, mut vaik diat oli vinossa niin ne näki ihan hyvin. Näki ihan hyvin ja pystyi palaamaan helposti ja oli hyvin lähellä todellista elämää.

9, ehkä napin painaminen mikä ei toiminut oli jännä hetki ja odottamaton juttu ja kun virtuaalikäsi upposi pöydän läpi niin aivot ei ihan osannut yhdistää mitä silmät näki ja aivot, mitä virheitä tuli ja oli niin niistä toivuttiin

10. Jos on staattinen työpiste, niin voisi olla joku konkreettinen pöytä esim. ja voisi olla interaktiota yleisössä, jos jaksaa koodata, ja miten kommunikaatio sulautuisi sinne sun tekstin keskelle. En tullu kokeilleeksi kävelyä, miten se vaikuttaisi, jos opettaja olis voisi vaikka kokeilla kävelyä, pientä viilaamista

11.Ni nii se ohjelma vois antaa yhteenvedon et käytit sitä sanaa niin ja niin monta kerta ja äänenkäyttöä, ja taukoihin liittyviä asioita ja tukee helposti lauseisiin taukoja ja voisi treenata

erilaisia puhetyylejä, Jos tää on puheiden tai luennon pitämiseen niin jollain analytiikalla voisi jo päästä pitkälle, et mitä sanoi, käytit ja miten paljon.

12.Nii palkitseminen siitä et puhut tietyll tavall ja ajattelet tietyllä tavalla, ja jokaisella on oma tapa puhua ja tyyli niin, et.

13. Mukaileehan se todellisuutta et voi käydä ulkona tuulettumassa et ajattelet hetken muuta, koen, että rauhoitti? ja et ei tarttenu heti kävellä sinne saliin.

Appendix 2.2. Interview: VR-simulation Main test, Interview transcript 2.

Pro Haastattelu 20190516 1325

1. Pretty much like speaking in real life same emotion like in real life like anxiety and stress

2. I do see the potential in this, Lot of my focus was on slides and the audience, tutor: I realised I was kind of too focused in the stuff than the tutor I could follow the tutorial, this was because, because this is so full-blown experience.

Teach to speak, I think it would help and I could see myself using this

3. Comfort: This isn't real in my head, it was kind of ok, bur because we were here all its raises fear of being evaluated. If I was alone I would feel more confident and non-stressful

4. There's always a point when video repeats , but it doesn't matter, much

5. Very! VR was very immersive, and I feel the anxiety and remined of it, so it was very immersive,

6. How about interactive services/functionality

Changing the slides was weird, no feedback in changing slides, because the audience is not real I didn't give that much

7. Hints, tutor etc?

Too focused on slides and making presentation work, checked tutor, but didn't care much about him, maybe possibly if it was more visible it would work better , because needs to continuously look to see tutor

8. Technical language setting to Finnish, it simulates the feeling when something goes wrong, this could be built in the system as well, cutting snapping.

9. Finally more ideas and fb about this and development ideas: Usually focus much if the content is understandable, content Fixes

10. Ain thing to use services, is about being understood in front of the audience, concept is very interesting, If the information conveyed is received

11. Gamification: In general sense this can be used, but it should be used very carefully, how not to be so anxious, very easily negative feedback on the points, people are already anxious, and it does not build their confidence, but opposite.

12. Have never tried to do this, but if its proven to work it might , the visual would have an impact, but I have never tried that

13. It's very interesting concept, I think this can really help!

Appendix 2.3. Interview: VR-simulation Main test, Interview transcript 3.

Haastattelu 1, litteroitu 20190516

1&2 kyllä, kunhan parempi interaktio ja immersio, parantamalla saadaan kyllä sparraustyökalu ja ei tuntenut kosketusta tai laite, jolla vaihtaa diaa haparoida ilmaa, että asia tapahtuu, jos olis ulkona

3 edelliset

Dialogi yleisön kanssa puuttuu interaktion puuttuminen ja rajattu paikka ei voinut elehtiä ja liikkua tilassa

4 äänet puuttuivat, tilaääntä ja ihmisten ääntä toisi lisää immersiota ja tarkempi videokuva autenttisuus oli vielä hakusessa

5 pystyi eläytymään tilanteeseen, ku esitys oli avoin esitys meni rutiinilla

6 kädet näkyivät harvoin, liikkeen seuraus oli hyvä ja nopea, opettelutti välillä haptisuus puuttui

7 hankala ottaa kontakti yleisöön koska kuva oli suttuinen,

8 en ymmärtänyt hahmon vihjeitä tarvitsisi esim. tutoriaalin

9 ei

10 Ehkä lisäksi esityskaukosäädin olisi parempi kuin äänet yleisön reagointi tarkempi kuva yleisöstä

11. Palaute siitä miten meni, miten katsekontakti mahdollisuus katsoa esitys uudestaan maneerit videoista

12. Pelillistäminen ehkä visuaalinen palaute reaaliaikaisesti voisi olla hyvä värin muutos esim. ja assistentti enemmän läsnä kehonkielen palaute ja muut eleet puhujan pömpeli vaarana, että yrittää ottaa pömpelistä kiinni ei voinut tehdä sitä, puhujan pömpeli voisi olla poissa.

13. Vikaks yleisön reagointiin reagointia, esim. jos yleisö kysyy jotakin, miten reagoidaan, opettaa myös tätä, opetustilanteiden treeni voi olla hankaa tällä.

Appendix 2.3. Interview: VR-simulation Main test, Interview transcript 4.

Pro Haastattelu, litteroitu 20190516

1 samantapainen kui oikea jännitys tuli siellä olemisen tuntu

2 koen, tässäkin muodossa jonkin verran, mutta lopullisessa varmasti voisi poistaa jännitystä

Perustele: Paremmat kädet, miten parantaisi esiintymisjännitystä, harjoitus tekee mestarin, voi harjoitella vain ihmisten edessä voi treenata muutoinkin, kun on tällainen sovellus, kun saa oman esityksen niin voi treenata sitten sitä tämä on spesifi työkalu

3 Visuaalinen ilme ja perspektiivi kun näen yleisön ja oli autenttinen, kun näki esitysmateriaalin vertaa, interaktio yleisöstä puuttui ja auditiivista palautetta ei tullut oikeasti on aina jotakin ääntä, jos olisi ääntä, niin tekisi immersiivisemmän

4 tosi hyvin pystyi uppoutumaan, olipa hiljaista, oikeasti on ääntä ja interaktiivisuutta, se puuttui ja rikkoi immersiota, harjoitustyökalun ja oli hyvä

5. Seurasi tosi hyvin, snappi, nappi haptinen palaute puuttui trakkasi tosi hyvin,

Diojen vaihtaminen katsekontaktin vaihtaminen oli hyvä, kuva olisi hyvä olla tarkempi, kun katsoi henkilöä, niin oli liian epätarkka, jos on tapana ottaa joku yleisöstä ja unohtaa loput yleisöstä niin immersio kärsi

Haptisen palautteen puute oli puute

Käyttöympäristö oli helppo ja yksinkertainen

Tutor-hahmo, alussa katsoin mutta jäi huomaamatta

Ongelmakohtia: Ei muuta kuin diat lipsahtelivat välillä, kun ei tiennyt, että painoiko ja äänten puute

Kehitysideoita:

Hanskat haptisuuteen, lisää aisteja lisää kokonaisvaltaista immersiota, jotain ääntä olis hyvä, viimeistellympi ulkoasu, tekstuuri käsiin, tarkempi yleisö.

Palautetta esityksestä? Se aikana, tekoäly olis kiva, äänen voimakkuus ja sävyt olisi hyvä, pulssin mittaaminen, ota rauhassa älä jännitä yms. palautetta esittämisen aikana

Pelilliset elementit: Miksei, mutta optio koska kaikki ei tykkää, mutta en pakottaisi sitä kaikille,

Kuvat ja musiikki: Hyvä idea et voisi valita millaista ja voisi valita kuvia tai musiikkia tai molempia!

Appendix 3. User satisfaction questionnaire

University of Tampere

USER SATISFACTION QUESTIONNAIRE

Below are some statements related to the VR service you tested. Please select the option that best matches your level of disagreement of agreement with the statement.

Evaluate the following statements	Strongly disagree				Strongly agree
The service was easy to use.	1	2	3	4	5
It was hard to perform the given task.	1	2	3	4	5
The visual appearance of the service was pleasant.	1	2	3	4	5
The user experience with the service was authentic.	1	2	3	4	5
The service included unfamiliar/difficult terms.	1	2	3	4	5
It was easy to navigate/ move (gestures) on the VR-environment.	1	2	3	4	5
The information provided by the service is valuable to me.	1	2	3	4	5
I would like to use the service also later.	1	2	3	4	5

Which overall grade would you give to the service (on a scale from 1=poor to 5=very good)?

_____

Thank you! Your responses will be processed confidentially.

Test team fills in: Group name: _____ Participant ID: _____

Collected and reviewed by Ahola, Mäkinen & Latva (2018) along Witmer, B. G., & Singer, M. J. (1998)

Appendix 4. Pre-test of design process, mock-up phase, a questionnaire based on SCI-questionnaire Ermi&Mäyrä (2007) and form in Finnish: Immersion and presence form

A questionnaire for measuring and evaluating immersion: SCI Questionnaire form in Finnish: SCI-lomake Ermi&Mäyrä (2007) (The VR-application was created 2019 spring in collaboration with Mikael Latva of Internet and Game Studies and with Jyri Mäkinen and Tuomas Ahola of human technology interaction research starting on (2018.)

Alkuperäiset (=suomenkieliset) väittämät SCI-immersiokyselystä:

1 Pelatessani olin hyvin keskittynyt omaan suoritukseeni.

2 Pelin tapahtumat tuntuivat tapahtuvan minulle.

3 Peli näytti uskottavalta ja todelliselta.

4 Peli tuntui sopivasti haasteelliselta.

5 Nautin pelin tarjoamasta fantasiasta tai tarinasta.

6 Minulla oli pelatessani selkeitä tavoitteita, joiden saavuttamiseksi yritin tehdä parhaani.

7 Pelihahmo tai -hahmot tuntuivat eläviltä persoonilta.

8 Äänet tuntuivat tulevan peliympäristön eri suunnilta.

9 Pelitapahtumat saivat minut liikuttumaan.

10 Minulla oli selkeä tunne siitä, että tiedän mitä olen tekemässä ja miten siinä edistyn.

11 Eläydyin siihen, miltä pelihahmosta tuntui pelin eri tilanteissa.

12 En huomannut ajan kulumista.

13 Koin yhteenkuuluvuutta pelin tilanteen kanssa.

14 Pelin äänet peittivät alleen muut ympäristön äänet.

15 Pelin kautta käsittelin myös omia tunteitani.

16 Uppouduin pohtimaan pelin asettamia pulmia ja älyllisiä haasteita.

17 Pelatessani olin kokonaan keskittynyt havainnoimaan pelimaailmaa ja sen tapahtumia.

18 Peli haastoi minut ponnistelemaan taitojeni rajoilla.

Appendix 4.1. A VR-presence questionnaire (Witmer & Singer, 1998)

Bob G. Witmer and Michael J. Singer. 1998. Measuring Presence in Virtual Environments: A Presence Questionnaire.

https://nil.cs.uno.edu/publications/papers/witmer1998measuring.pdf

Table 2. *Presence Questionnaire Item Stems (Version 2.0)*

Item Stems	Factors	Subscale	*ITCorr*
1. How much were you able to control events?	CF	INV/C	0.43*
2. How responsive was the environment to actions that you initiated (or performed)?	CF	INV/C	0.56*
3. How natural did your interactions with the environment seem?	CF	NATRL	0.61*
4. How completely were *all* of your senses engaged?	SF		0.39*
5. How much did the visual aspects of the environment involve you?	SF	INV/C	0.48*
6. How much did the auditory aspects of the environment involve you?	SF	AUD[a]	0.32*
7. How natural was the mechanism which controlled movement through the environment?	CF	NATRL	0.62*
8. How aware were you of events occurring in the real world around you?	DF		0.03
9. How aware were you of your display and control devices?	DF		−0.14
10. How compelling was your sense of objects moving through space?	SF	INV/C	0.51*
11. How inconsistent or disconnected was the information coming from your various senses?	RF		0.33*
12. How much did your experiences in the virtual environment seem consistent with your real-world experiences?	RF, CF	NATRL	0.62*
13. Were you able to anticipate what would happen next in response to the actions that you performed?	CF	INV/C	0.43*
14. How completely were you able to actively survey or search the environment using vision?	RF, CF, SF	INV/C	0.59*
15. How well could you identify sounds?	RF, SF	AUD[a]	0.34*
16. How well could you localize sounds?	RF, SF	AUD[a]	0.30*
17. How well could you actively survey or search the virtual environment using touch?	RF, SF	HAPTC[b]	0.15
18. How compelling was your sense of moving around inside the virtual environment?	SF	INV/C	0.62*
19. How closely were you able to examine objects?	SF	RESOL	0.55*
20. How well could you examine objects from multiple viewpoints?	SF	RESOL	0.49*
21. How well could you move or manipulate objects in the virtual environment?	CF	HAPTC[b]	0.11
22. To what degree did you feel confused or disoriented at the beginning of breaks or at the end of the experimental session?	RF		−0.06
23. How involved were you in the virtual environment experience?		INV/C	0.52*
24. How distracting was the control mechanism?	DF		0.37*
25. How much delay did you experience between your actions and expected outcomes?	CF	INV/C	0.41*
26. How quickly did you adjust to the virtual environment experience?	CF	INV/C	0.42*
27. How proficient in moving and interacting with the virtual environment did you feel at the end of the experience?	CF	INV/C	0.45*
28. How much did the visual display quality interfere or distract you from performing assigned tasks or required activities?	DF	IFQUAL	0.44*

Table 2. *(Continued)*

Item Stems	Factors	Subscale	*ITCorr*
29. How much did the control devices interfere with the performance of assigned tasks or with other activities?	DF, CF	IFQUAL	0.44*
30. How well could you concentrate on the assigned tasks or required activities rather than on the mechanisms used to perform those tasks or activities?	DF	IFQUAL	0.51*
31. Did you learn new techniques that enabled you to improve your performance?	CF		0.33*
32. Were you involved in the experimental task to the extent that you lost track of time?		INV/C	0.41*

Note. Major Factor Category: CF = Control Factors, SF = Sensory Factors, DF = Distraction Factors, RF = Realism Factors. Subscales: INV/C = Involvement/Control, NAT = Natural, AUD = Auditory, HAPTC = Haptic, RES = Resolution, IFQUAL = Interface Quality. ITCorr = Pearson correlation coefficients between PQ item scores and the PQ Total Score.

[a]No auditory stimulation was provided in our experiments.

[b]No haptic stimulation was provided in our experiments.

*$p < .001$